Gas Journal

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Editorial Notes

Important New Regulations

On later pages we publish an important document just issued by The Institution of Gas Engineers on behalf of the Gas Industry—"Regulations governing the Installation of Gas Service Pipes, Gas Supply Pipes, and Gas Appliances."

The need for such Regulations, comparable with the "Regulations for the Electrical Equipment of Buildings" issued by the Institution of Electrical Engineers, has become increasingly evident in recent years. The London County Council has been engaged upon the drafting of new Building By-Laws, while the Ministry of Health and the Board of Trade have been respectively concerned regarding risks from fire and poison resulting from unsatisfactory gas installations. The Regulations now issued should be received with satisfaction by these and other public Authorities.

The Committee responsible for preparing the new Regulations consisted, as originally set up by the Council of the British Gas Federation, of two representatives nominated by each of the five constituent bodies of the Federation—viz., the British Commercial Gas Association, the Gas Companies' Protection Association, The Institution of Gas Engineers, the National Gas Council, and the Society of British Gas Industries—with power to co-opt. It was thus truly representative of the whole Gas Industry. The draft Regulations, having the unanimous support of the Committee, were submitted to and approved by the Council of the British Gas Federation, who referred them to the Council of The Institution of Gas Engineers with a request that, if approved by the latter, they should be published as Regulations of The Institution of Gas Engineers.

The Regulations include Sections dealing with service pipes, meters, internal or carcass pipes, testing of internal or carcass pipes and fittings for soundness, connections for portable appliances, gas appliances, ventilation of appliances, electrical and thermal insulation. There are also schedules on materials for service pipes, dimensions of internal or carcass pipes, materials for internal or carcass pipes, and a Specification for Brass Tubing for the Gas Industry.

It is not claimed that these Regulations constitute a complete or sufficient code covering the installation of domestic gas equipment, but they should form the nucleus of more comprehensive Regulations which can be prepared as and when the necessity arises. We urge that these Regulations, representing the considered opinions of all sections of the Gas Industry, deserve to be universally adopted and widely circulated to all interested individuals and bodies. Copies—price 1s. 6d. each; ten or more copies 1s. each—may be obtained from the Secretary of The Institution of Gas Engineers.

Gas in Ireland

In a comment in the "Journal" last week on the Annual Meeting of the Irish Association of Gas Managers we referred to the optimistic attitude which prevailed in regard to the future of gas in Ireland in face of State-aided competition from electricity. That there is ample justification for this bright outlook was well brought out in the Paper by Mrs. Eileen Murphy at the meeting. Last year Mrs. Murphy dealt with the Gas Industry in the Irish Free State; as a fitting sequel the present Paper, which will be found on later pages of our issue to-day, is devoted to the Industry in Northern Ireland. Since 1924 sales of gas in Ulster have risen by nearly 30%, and the main cause of this is the increasing use of gas in the average home. Mrs. Murphy mentions that the average consumption per consumer is 35,000 cu.ft. Until, however, industrial consumption is considered as distinct from the domestic consumption, and reported separately, we shall never get a true picture of the average consumption per consumer. On many occasions we have pointed to the desirability of treating the industrial load on a different basis from the domestic, for the present method of arriving at the average consumption per consumer figure is decidedly misleading. "The acid test of any country's Gas Industry," says Mrs. Murphy, "is not so much the number of gas consumers as the extent to which gas is used by the average family." This is true enough, and we surely ought to set out our statistics in such a way that the issue is not clouded by the inclusion of the industrial load.

In Northern Ireland there is an equal balance between industry and agriculture; half the people live in towns and the other half in the country. It is natural that the

Gas Industry should flourish mainly in thickly populated districts; but it speaks well for the enterprise of the smaller undertakings—and sixteen of the twenty-five undertakings in Northern Ireland operate in districts of less than 10,000 population—that, in spite of the high proportion of country dwellers, over 60% of the total number of families enjoy a gas supply. The healthy state of affairs outlined in the two Papers given by Mrs. Murphy, and the possibilities of future development envisaged, cannot do otherwise than encourage those responsible for the prosperity of gas undertakings—irrespective of size—throughout Ireland to further efforts, confident in the knowledge that the Irish public is more and more appreciating the value of gas service. This applies to both domestic and industrial service. As far as Northern Ireland is concerned, more than 12% of the total output of gas is supplied to workshops and factories, and the proportion is growing.

This marked trend towards the use of gas in industry applies similarly to the Irish Free State, and it gives point to the suggestion made by Mr. F. J. Edmonds, of Waterford, that the Gas Industry in Ireland should establish an Industrial Development Centre. For our part we can see nothing but benefit if this suggestion is acted upon. The Industrial Centres which have been established for some time now in this country have done an enormous amount of good work in helping individual undertakings to increase the uses of gas for industrial and commercial purposes. At the meeting Mr. Edmonds mentioned that his own undertaking was attached to the Cardiff Centre, and, he said, " it is a great joy to belong to such an industrial group." Whatever problem he may be faced with, big or small, he is able to pass it on to the Centre for advice. Given support, a Centre could surely start to work with a swing in Ireland. In Belfast, for example, 1,592 industrial consumers take over 14% of the total gas sales. Industrial sales in Dublin account for 12·7% of the output, in Sligo for 20%, in Monaghan, with an output of 15 million cu.ft., for 37%. There must be amassed a wealth of information concerning the application of town gas to all sorts of industrial and commercial purposes in Ireland. This information could be made available, through an appropriate Centre, to all subscribing undertakings, and many a load might be gained which would otherwise go to competitors. The suggestion put forward by Mr. Edmonds has everything to commend it.

An Aspect of Competition

At the beginning of the year we called attention in these columns to what the American coal trade is doing to encourage people to use coal in place of other fuels. The coal is being sized, cleaned, and graded so that the quality and nature of the fuel provided shall suit customers' appliances. In certain instances the packing is such that, when re-fuelling becomes necessary, a " package " of coal placed on the fire distributes half-a-dozen compressed blocks of coal evenly over the surface of the fire when the wrapper has burnt away. Another refinement is treatment for dust prevention, so that a load of coal can be dumped and " got in " during a wash-day without soiling the clothes which may be hanging to dry on the line outside. More important, we suggest, is the rapid development of the automatic stoker. Mechanical stokers are being made, and sold in quantity, of a size small enough to feed less than 20 lb. of coal per hour. In a Paper presented at the recent Annual Convention of the Canadian Gas Association Mr. E. F. McGarvey, of Edmonton, stated that the sales of residential coal stokers in the United States in 1936 amounted to about 80,000 units—an increase of about 30,000 units over the year 1935. The modern stoker is equipped to burn all kinds of coal, and the manufacturers are taking steps to combine with their machine a boiler or furnace as an integral part of the modern heating plant and air conditioning system.

Conditions in the United States of America and in Canada differ widely from those obtaining in this country. Due to climatic conditions resort must be had in Canada and the U.S.A. to widespread central heating. At the same time, these developments in automatic house heating appliances burning raw coal without the need for much attention cannot be airily dismissed, for we feel they may have their repercussions in this country. Here they will be in competition not so much with gas as with coke, and it has to be admitted that they can consume with quite a high degree of efficiency low-grade and cheap coals. We think that we have not yet felt the full force of competition from coal for central heating for both large-scale and small-scale work. The gravity-fed coke boiler has rightly met with popularity and approbation in areas where its merits have been sung and demonstrated, but in our opinion we shall have to call in a good deal more general salesmanship to push this and other types of coke burning appliance if we are successfully to withstand the likely onslaught of raw coal in this country. We have a good start and we hold the winning cards. Our problem is to play these cards to the best advantage.

Coal Utilization Research

Our point is that only just recently has the coal industry awakend to the need for research into the utilization of its product for both industrial and domestic purposes. It has been content to load the raw material into wagons at the collieries and count on the Englishman's conservatism to effect its sale. In the past year or so the situation has undergone a change, and movements on foot will make this altered attitude more pronounced. Given good salesmanship in the Gas Industry, we have no fears regarding the competition from coal, but we must keep check on what the other fellow is doing. At the moment the coal industry is considering very closely the question of research from the several angles of co-ordination, direction, and finance. The laboratories of the Coal Owners' Research Association have recently been transferred from Birmingham to London, obviously as a step to more intensive and more effective work. The attention of coal owners is being increasingly directed towards the utilization of fuel; and this province embraces such questions as the perfecting of marketing organization, the training of salesmen, and the collection of trade statistics. As far as finance is concerned, a levy limited to one-twentieth of a penny per ton of coal would furnish a fund of about £50,000 per annum. Then we have the Coal Utilisation Council and the Combustion Appliances Manufacturers' Association busy at work in the endeavour to persuade domestic and industrial consumers that raw coal is the fuel to satisfy their needs. All avenues are being explored; as an example, the Coal-burning Appliances Joint Consultative Board has just issued details of a new hire-purchase plan to apply to dealers. Features of the scheme are that the dealer receives the total cash price of a coal-burning appliance when the transaction is completed, that the consumer may spread the cost over a suitable period of time, and that each transaction is per-

sonal between the dealer and his customer. An after-sales service is provided, an insurance fund is to be created to protect the dealer against losses, and a service fund is to be created to assist him in cases where circumstances over which he has no control have given rise to complaint regarding any equipment installed. No longer will the consumer have to buy his coal-burning equipment outright; and the Gas Industry well knows the attraction of this method of purchase. Coal-burning appliances are undergoing much improvement, and competition from this point of view will without doubt become keener. But we have a superior fuel and superior equipment. What we must retain is superior salesmanship throughout the country.

The advantages of gas over coal need not be stressed in these columns. We must always bear in mind, however—and for long we have been at pains to emphasize this—that the Gas Industry is catering for a mass market. It is this fact which makes it essential that we should approach the problem from the all-in fuel cost and offer gas for additional use at prices competitive with those appertaining to the use of raw coal. This can be done by two-part or other tariffs, and it is good to see that undertakings in the midst of the coalfields, where the miners are allowed " free " coal, are pursuing the policy of attractive gas pricing. Among the latest to introduce a two-part tariff in a colliery area is the Wath, Bolton, and Thurnscoe Gas Board, particulars of whose scheme will be found on a later page of the " JOURNAL " to-day.

Briquetting

BRIQUETTING is an operation that has been singularly little employed by gas undertakings, probably because it is used only to enhance the value of solid fuel, and because there are other and easier ways of disposing of coke breeze. It is quite a point, however, whether it might not sometimes pay to purchase slack coal and to briquette it for use in continuous vertical retorts. As long ago as 1906 the United Gas Improvement Company of U.S.A. built a plant to briquette coke breeze mixed with anthracite, using coal tar pitch as a binder The briquettes were used for water gas manufacture and were stated to be quite satisfactory for that purpose. This is not the only example known of the use of a briquetting process by the Gas Industry, but it is quoted here as an instance of the possibilities. Several low-temperature proposals have been based upon the briquetting of the smalls produced in rotary retorts, but it is frequently stated that the costs incurred rule the process out of consideration. This generalization is too sweeping, as will be seen from the fact that a large low-temperature installation to treat 450 tons of coal per day now under construction is based upon the carbonization of completely non-coking coal in rotary retorts, and the subsequent briquetting of the residual coke; this process has been operated for some years in a 100-ton a day unit.

An interesting publication on briquetting has just been issued by the Department of Mines and Resources of Canada summarizing the work that has been done upon the subject, much of which is due to the officers of the Department. An interesting and important fact there disclosed is that investigations, especially those of the Fuel Research Laboratories of the Department of Mines, Ottawa, have indicated that the briquetting amenability of a bituminous coal bears a similar relation to its rank as does the coking property. Those coals which are considered to have the optimum coking properties for by-product use are just those which yield the best briquettes from the standpoint of weathering, strength, and burning properties. The sub-bituminous non-coking coals, however, require the addition of some 15 or 20% of a strongly coking coal in order to produce a briquette of good quality. So far has this principle been taken that it is deemed impossible to briquette anthracite successfully unless it is mixed with at least 5% of a strongly-coking coal.

Once this principle has been grasped—and it is only recently that the correlation between coking power and " briquettability " has been established—the difficulties of briquetting coke breeze become apparent. It behaves, of course, as an inert material with the added disadvantage that its porosity and absorptive power make it necessary to use a large quantity of binder. Coke fines are, moreover, very abrasive and repairs and replacements are prone to be high as compared with coal briquetting plants. An interesting observation made in the Canadian report is that coke breeze briquettes more easily when mixed with a low-volatile strongly-coking coal. A mixture of flour and pitch is considered the best for briquetting coke, but when pitch is used alone a smaller quantity is required and the briquette is stronger when the binder is added in the liquid form. It is easier to briquette semi-coke than high-temperature coke, and this material is a good deal less abrasive. Nevertheless it is considered equally desirable to add the 5% of strongly coking coal as when briquetting high-temperature coke. In any event, when briquetting coke, the resulting product will be smoky unless it is re-carbonized. This has in many instances proved the principal bar to the process, for the breakage during this process is usually considerable. It is stated reliably that a stoving muffle has been devised which reduces the breakage to very small proportions indeed. It is evident that considerable strides have been made recently in the art of briquetting coke breeze.

The Future Course of Trade

WHETHER the present trading activity will be followed by a slump as has been general in the past is a problem that concerns everyone. Economists have urged that now, when there is fairly general prosperity, is the time to take measures to prevent the constant recurrence of slumps. Many of the measures suggested are of a technical character that can be fully understood only by the professional economist or the banker, but one which is plain to everyone has been that non-essential work should be postponed until the slackening of the re-armament programme shall cause engineering and other works to be less busy. It is also suggested that a proper programme of useful public works should be drawn up that can be put into operation as soon as normal trade slackens. This is all very well in its way, but it is difficult to discover remunerative public works, and to build unremunerative works is not noticeably different from paying the dole to those unemployed.

The Westminster Bank Review contains a useful discussion of the question of whether the theory of the trade cycle is correct. It is argued as to whether a recession of trade is imminent or distant, and whether, should it come, it is likely to be severe. There is no immediate sign of any slackening in trade; apart from the usual summer " laziness," there is intense activity. Danger signals are not lacking, however, and two of the chief of these are the sharp rise in costs, wages, and prices during the past year, accompanied by a serious shortage of skilled labour with its usual concomitant of increased

labour rates which affect the prices of finished goods. The housing programme, too, must have passed its peak, and the re-armament programme is unfortunately affecting just those industries where recovery was already most evident. The Bank also sees evidence of rising interest rates, which will have a detrimental effect on future orders, particularly in the equipment and constructional industries.

On the other hand, there is the cheerful prospect that our export trade may rise. Industry in general shows a level of activity some 25 or 30% above that of 1930, but the value of British exports in the first six months of the year, although 20% higher than for last year, is still 12% less than that of 1930. Overseas markets are more prosperous because the primary producing regions have been encouraged by a larger demand and higher prices for their raw materials and foodstuffs. Our protective tariff has had a considerable effect in permitting our own home industries to work more efficiently by removing the competition of low-wage countries. The volume of world trade is still only 92% of that of 1929, but until the nations generally lower their trade barriers it is difficult to see how the level can rise to what it should be. Perhaps the greatest single step that could be taken in the direction of trade improvement is for the nations generally to take steps that would lead to greater flow of trade internationally. The obstacles are immense, and have not lessened with the passing of the years; to remove them will be a task of real statesmanship that must be shared by every nation, but unless we are to be content with a lower level of trade than is necessary, the way to remove those barriers must be found. Undoubtedly the suspension of the gold standard will assist us in meeting any slackening of trade that may occur. The future is still bright—its brightness is undiminished—but we must take positive steps to keep it so. The Gas Industry is no less interested than are other industries in this vital problem of the maintenance of general trading activity.

Correspondence

Holidays with Pay

SIR,—For many months I have been collecting data regarding holidays with pay.

I should be very glad to know of any firm connected with your Industry that gives holidays with pay (and/or any other concessions to their workers).

Could any employers of labour help me by sending information? All letters will be acknowledged.

Yours, &c.
JAMES S. WHITTAKER.

180, *Fleet Street*,
London, E.C. 4,
Aug. 17, 1937.

Personal

Mr. ALAN R. C. JOHNSTON is from Sept. 1, 1937, joining the firm of William Edgar & Son, Ltd., of Hammersmith, as Sales Manager and Special Representative.

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Mr. H. V. PYE, formerly Acting-Manager of the Peterborough Gas Company, has been presented by his colleagues with a silver cigarette box; the formal presentation being made by Mr. R. C. Wardell, Assistant Engineer and Manager. Mr. Pye has taken the post of Manager and Secretary of the Tavistock Gas Company.

Obituary

Mr. JOSEPH NORTH, for many years Chairman of Syston Gas Company, has died at his home, Brookfield House, Syston.

* * *

The death is announced of Mrs. Pelley, wife of Mr. C. A. PELLEY, for many years Accountant to the Torquay and Paignton Gas Company.

Amalgamation and Grouping

United Kingdom and Northwich.

The Northwich Gas Company has received an offer from the United Kingdom Gas Corporation to purchase all the stocks and shares of the Company, the issued capital of which consists of £56,362 in ordinary stock, 2,565 preference shares of £10, and £11,630 in preference stock.

In This Week's "JOURNAL"

Ulster's Public Servant No. 1.

The acid test of any country's Gas Industry is not so much the number of gas consumers as the extent to which gas is used by the average family — the consumption per consumer. In this respect Northern Ireland ranks level with the chief gas-using countries of the world. Its 165,000 gas consumers use close on 6,000 million cu.ft. of gas a year. The average individual consumer uses 35,000 cu.ft. a year. This compares well with any other country. So said Mrs. Eileen Murphy in the course of her Paper to members of the Irish Association of Gas Managers presented at the Annual Meeting of the Association held at Belfast.

See p. 459.

Electric Welding Applied to Gas Plant.

In his Paper read before the Irish Association of Gas Managers at their recent Annual Meeting at Belfast, Mr. H. H. Hollis deals with the application of electric welding in the erection and repair of gas-works plant. He deals particularly with gasholders, observing that he knows of no gas-works plant where welding can be of greater service than gasholders. Having referred to the clause of the new Factories Bill which concerns this work, Mr. Hollis goes on to discuss actual welding jobs within his experience, illustrating his examples with a number of interesting photographs. He finally expresses the opinion that electric welding is to be preferred to riveting for any type of gas-works plant constructed of mild steel plates, while the cast iron work used in purifiers and other plant can with advantage, he suggests, be replaced by welded steelwork.

See p. 461.

New I.G.E. Regulations.

Regulations governing the installation of gas service pipes, supply pipes, and gas appliances have just been issued by The Institution of Gas Engineers with the collaboration of the British Commercial Gas Association, the Gas Companies' Protection Association, the National Gas Council, and the Society of British Gas Industries, and with the approval of the British Gas Federation. These Regulations relate to the materials to be used, methods to be adopted, and conditions to be observed when laying gas services, piping premises for gas, and fixing gas-burning appliances. They enumerate the main requirements and precautions for ensuring economical and satisfactory results as applied to the gas equipment of domestic buildings. The Regulations are not intended to take the place of detailed specifications but to serve as a guide to the main points to be observed by those responsible for gas installations, and as supplementary to any statutory regulations.

See p. 471.

Modern Fixing Practice.

Mr. R. N. LeFevre, Officer-in-Charge of Training, Gas Light and Coke Company, in the course of an interesting article, draws attention to the valuable contribution which the use of Rawlplugs makes to modern gasfitting practice where it is often necessary to fix appliances firmly to walls and be sure that they will remain secure under working conditions. A series of diagrams clearly illustrates the actual application of Rawlplugs to various gasfitting jobs.

See p. 475.

News in Brief

CURRENT EVENTS IN THE GAS INDUSTRY

The Erection of Vertical Retorts at Largs Gas-Works will shortly be undertaken, the estimated cost of which is £14,870. The building is to be turreted after the Scottish Baronial style.

Applications Are Invited by the Dudley, Brierley Hill, and District Gas Company for the position of Deputy Engineer and Managing Director. Further particulars of the position, which carries a commencing salary of £500 per annum, will be found in our advertisement columns.

Of the 22,748 Public Lamps in Sheffield, 15,677 are gas, while the remaining 7,071 are electric. Of the City's 596 miles of thoroughfares which are lighted, 446·5 are catered for by gas and 149·5 by electricity. The consumption of the gas lamps totals 269,662,295 cu.ft. per annum.

Application for a Special Order under the Gas Undertakings Acts, 1920 to 1934, is intended to be made to the Board of Trade by the Bedford District Gas Company with the objects *inter alia* of extending the limits within which the Company are authorized to supply gas and of empowering the Company to acquire certain lands for gas-works purposes.

The Third Electricity Breakdown in twelve days occurred last Friday in the Deal district, lasting for an hour with consequent inconvenience to domestic users and places of entertainment alike. Fortunately the public lighting of the Borough is by gas, so the streets were not affected by the failure. The previous failures occurred on Aug. 9 and 10.

An Examination for Admission to Associate Membership of the Institute of Marine Engineers is to be held on May 16-19, 1938. The annual examination for admission of Probationer Students and Students will be held on May 23-31, 1938. Full particulars of the syllabus and exemptions allowable may be obtained on application to the Secretary, The Minories, E.C. 3.

The Ninth Annual Conference of the National Smoke Abatement Society will be held at Leeds from Sept. 30 to Oct. 2. On the evening of Sept. 30 there will be a reception by the Lord Mayor of Leeds, Mr. T. Coombs, at the Civic Hall. The business sessions will be held on Friday, Oct. 1, and during the morning of Saturday, Oct. 2. On the Saturday afternoon there will be a motor tour by invitation of the Leeds Health Committee.

"**The Freeze that Flames**" is a slogan that springs readily to mind on reading of the recent extraordinary behaviour of an electric refrigerator at Abertillery. It was only the timely arrival of the fire brigade that prevented it from undergoing a complete change in its functions and probably setting fire to the butcher's shop in which it was installed. Smoke was seen issuing from the shop, and, when entered, it was found the refrigerator was on fire, owing to the driving mechanism having become overheated.

Interesting Sidelights on the Past are provided by an article now appearing in instalments in the *Dorking and Leatherhead Advertiser* by Mr. John Young, F.C.I.S., who retired from the Secretaryship of the Leatherhead Gas Company when, in April last year, it was acquired by the Wandsworth and District Gas Company. The time, states Mr. Young in the course of his article, seems appropriate for placing on record a brief history of the Leatherhead Company, which, it is hoped, will be interesting not only to shareholders but to local residents.

Out of 45,000 Miles of pipes and mains supplying essential services to the 8½ million inhabitants of Greater London there are, according to the *Daily Telegraph*, 12,000 miles of gas mains and 25,000 miles of smaller pipes and services. There are 8,000 miles of water pipes under the control of the Metropolitan Water Board and 400 miles of sewage mains. The works beneath the roads and pavements of London—revealed occasionally when repairs are being undertaken—are the most extensive and complicated in the world; this is true even when the underground railway systems are excluded. Yet every yard of the labyrinth is mapped, and before fresh work is undertaken by any one "statutory undertaker," all the others are consulted. There is truth as well as humour in the remark of the Cockney to his provincial niece on her first visit to the Metropolis that all London was "'oller."

The Directors of the Coatbridge Gas Company recommend a final dividend of 9¼% on the original stock, making a total of 14½% for the year, less tax. They also recommend a final payment of 12s. 11·4d. per share on the shares, making 19s. 11·4d. for the year, less tax. The Dundalk Gas Company have also declared an interim dividend of 25s. per share on the "A" shares and 17s. 6d. on the "B" shares, which rates are the same as last year. The Huntley Gas Company have declared a dividend of 10%, free of tax. The output of gas at Huntley has increased during the past year by 1 million cu.ft.

Long Service Certificates have been presented by the South Suburban Gas Company to employees who have recently completed twenty-five years' service. Among the recipients are Mr. Allen, of the Company's office at Orpington, District Inspector James Harris, and the following workers at St. Paul's Cray: Messrs. P. Mayatt, H. Gilham, W. Gilham, G. Carlow, H. Hayes, A. Eldridge, J. Mills, G. Lovelock, W. Wood, F. Grace, A. Gladdish, and R. Ward. Some of the recipients have 39 years' service—25 years with the South Suburban Gas Company, and 14 years with the old Bromley and Cray Gas Undertakings.

Forthcoming Engagements

Sept.

6.—LONDON AND COUNTIES COKE ASSOCIATION.—Technical Committee, 2.30 p.m.
6.—4th Meeting Arthur Duckham Memorial Fund Committee, 1, Grosvenor Place, S.W. 1, 4 p.m.
6-9.—A.P.L.E.—14th Annual Meeting and Conference at Folkestone.
9-10.—NORTH BRITISH ASSOCIATION.—Annual Meeting at Edinburgh.
14.—N.G.C.—Central Executive Board Meeting, 2.30 p.m.
15.—I.G.E.—Finance Committee, 10 a.m.; Membership Committee, 11 a.m.; Research Executive Committee, 2.30 p.m.
16.—WALES AND MONMOUTHSHIRE ASSOCIATION.—General Meeting at Porthcawl.
16.—I.G.E.—Gas Education Executive Committee, 11 a.m.; Refractory Materials Joint Committee, 2.30 p.m.
17.—I.G.E.—Joint Lighting Committee, 2.30 p.m.
20.—LONDON AND COUNTIES COKE ASSOCIATION.—Executive Committee, 11.15 a.m.; Central Committee, 2.30 p.m.
23.—S.B.G.I.—Council Meeting, 11 a.m.
26-29.—B.C.G.A.—Annual Conference at Manchester.
30.—I.G.E.—Gasholder Committee, 2.30 p.m.

Oct.

1.—I.G.E.—Liquor Effluents and Ammonia Committee, 11.15 a.m.; Joint Research Committee, 2.30 p.m.
5.—I.G.E.—Research Executive Committee, 2.30 p.m.
5.—SOUTHERN ASSOCIATION OF GAS ENGINEERS AND MANAGERS (EASTERN DISTRICT).—Commercial Meeting at Gas Industry House, 2.30 p.m. Discussion on Gas Mixing. Committee Meeting, 12 noon.
7.—I.G.E.—Joint Committee on Complete Gasification under Pressure, 3 p.m.
12.—I.G.E.—Board of Examiners, 10.30 p.m.
13.—I.G.E.—Finance Committee, 9.30 a.m.; Membership Committee, 10 a.m.; General Purposes Committee, 11 a.m.; Benevolent Fund Committee of Management, 12.30 p.m.; Council, 2.30 p.m.
19.—I.G.E.—Gas Education Executive Committee, 11 a.m.; Gas Education Committee, 2.30 p.m.
26.—B.C.G.A.—Eastern District Conference at Lincoln.
27.—B.C.G.A.—Northern District Conference at Darlington.

Nov.

2.—I.G.E.—Council, 9.30 a.m.; Council (*continued*), 4.30 p.m.
2 and 3.—I.G.E.—Autumn Research Meeting.
3.—BRITISH GAS FEDERATION.—Annual General Meeting and Dinner, Grosvenor House, Park Lane, W. 1.

Two Tariff Schemes

Below are details of two tariff schemes; one recently introduced by the Wath, Bolton, and Thurnscoe Gas Board with an annual make of 112 million cu.ft., and the other a reduction of the price of gas under the existing scheme of the Wellington (Salop) Gas Company, whose annual make amounts to 205 million cu.ft.

Wath, Bolton, and Thurnscoe.

Slot Meter Consumers.

Optional Domestic Two-Part Tariff:

SERVICE CHARGE: 6s. 6d. per quarter, paid in advance.
COMMODITY CHARGE: 7·2d. per therm, less 2d. in the 1s. discount (6d. per therm, or 2s. 6d. per 1,000 cu.ft. net).

Ordinary Meter Consumers.

Optional Domestic Two-Part Tariff:

SERVICE CHARGE: 10s. per quarter, paid in advance.
COMMODITY CHARGE: 5·4d. per therm (2s. 3d. per 1,000 cu.ft.).
CONTRACT: Guaranteed minimum consumption of 50,000 cu.ft. per annum, for the sum of £6 5s. (6d. per therm or 2s. 6d. per 1,000 cu.ft.), *plus* meter rent, paid in advance; in lump sum or quarterly payments of £1 11s. 3d. All gas consumed in excess of 50,000 cu.ft. in any one year to be charged at 6d. per therm.

Fish Frying, Bakers, and Confectioners.

(Minimum Consumption—50,000 cu.ft. per quarter.)

SERVICE CHARGE: 10s. per quarter, paid in advance.
COMMODITY CHARGE: 4·8d. per therm (2s. per 1,000 cu.ft.).

Central Heating.

(Minimum Consumption—100,000 cu.ft. per quarter.)

SERVICE CHARGE: 10s. per quarter, paid in advance.
COMMODITY CHARGE: 3·6d. per therm (1s. 6d. per 1,000 cu.ft.).

Wellington (Salop).

From Jan. 1, 1931, when the Company's two-part tariff was introduced, to June 30, 1937, the price for the first 45 therms (10,000 cu.ft.) in any quarter has been 6d. per therm or 2s. 3d. per 1,000 cu.ft., and all over 45 therms 5·33d. per therm or 2s. per 1,000 cu.ft.

Under the new scale, the first 45 therms in any quarter will be charged at 6d. per therm as previously; the next 225 therms at 4·66d., and all over 270 therms at 4d.

No alteration has been made in the fixed charge, which is 3s. in the pound on the first £20 of assessable value and 2s. in the pound on the balance.

Waste-Heat Recovery

Spencer-Bonecourt's Publication

There are indeed few firms of boilermakers in Great Britain who have not at one time or another supplied waste heat boilers. In their new publication "Waste Heat Recovery and Industrial Gas Firing" Spencer-Bonecourt, Ltd., claim this underlying difference between their activities and those of other concerns—a difference which concerns the angle from which the problem has been studied. Other firms, they state, largely depended on their fuel firing technique in their designs for waste heat boilers; their own boiler designs are based on different fundamentals. In the first place, they rightly observe, there is no control of combustion in waste heat recovery. Secondly, it is largely a matter of properly handling volumes of low-grade gases, as compared with the very much greater temperature range which applies to fuel firing designs. Thirdly, a waste heat boiler must be considered as an integral portion of the plant to which it is attached, and not as an entity apart.

This last point is perhaps the most important of the three, because it is a logical corollary to the first and second. In their publication Spencer-Bonecourt have not lost sight of this fundamental assumption of waste-heat recovery—viz., that the primary process conforms fully with modern ideas of efficiency as far as the main heat utilization cycle in the furnace itself is concerned and that waste-heat recovery is not practised to cover up defects in the early sections of the furnace unit. In other words, all gains must be strictly net additions to the heat balance-sheet under conditions appertaining to good normal practice.

The introduction deals with the evolution of the Spencer-Bonecourt boiler, the basis of the design being the scientific use of the phenomena appertaining to turbulent flow. In turn chapters then deal with general technical fundamentals, gas-works practice, steel and allied works, internal combustion engines—oil and gas, water gas plants, dry coke quenching, other industrial furnaces, and industrial gas firing. It will be gathered from these chapter headings that the field covered by the book is very wide—and so it is. The book is concluded with some details of the manufacture of Spencer-Bonecourt boilers in which every process is carried out to precise limits and materials are subjected to the closest chemical, physical, and metallurgical tests; saturated steam tables; factors of evaporation; and mean specific heat of superheated steam. The printing is in bold characters on art paper and there are many fine photographs showing, among other things, typical installations of S.-B. waste-heat boilers in various gas-works up and down the land.

Industrial Gas Burners and Accessories*

It is no exaggeration to express the view that one of the chief factors which has helped the widespread use of gas for furnace heating has been the ingenuity which has been exercised in the design of suitable burners. Furnace design has, to-day, reached a high pitch of perfection and high temperatures are achievable with a simplicity of control which would have been thought impossible a few decades ago, while furnace atmosphere may be adjusted at will to suit any special idiosyncrasies of the material under treatment. It is therefore an appropriate time to take stock of the situation and to review the progress which has been made, hence the appearance of a monograph with gas burners as its main theme is greatly to be welcomed. The author is a patent agent who has specialized in furnace heating equipment and his training and experience have provided the clarity of thought and power of critical appreciation necessary for the adequate presentation of a subject which is of a highly technical nature.

The subject of industrial burners is introduced after a brief discussion of fuels, combustion, gas manufacture, gas in industry, and the features and accessories of furnace installations. The history of the development of industrial burners is sketched with reference to the important advances made by Bunsen and by Méker, and an account is then given of high-pressure gas burners, mixing devices, and turbulent burners. Surface combustion and its later developments in the form of radiant heat burners are then described and the concluding section of this portion of the book is devoted to submerged combustion. Finally, automatic regulators and industrial gas meters are treated at ample length.

The principles of operation and the peculiarities of a large number of types of modern burners are discussed without, however, any bias on the part of the author, who expresses the view that there is no ideal or universal burner, hence the burner must be chosen in relation to the circumstances of each individual case.

The author deals with a subject which has, unfortunately, received but scant treatment in text-books and he has filled the gap in a very thorough manner. The latest volume of a well-known series of monographs is a very useful contribution to the technical literature of the Gas Industry.

* Industriegasbrenner und zugehörige Einrichtungen, by E. Sachs. Volume 35 of the series Kohle-Koks-Teer. [Halle (Saale) 1937; Wilhelm Knapp. Pp. vi. + 132, with 126 illustrations. Price RM.6.30 unbound, RM.7.35 bound.]

Athletic and Social

The London Coal Exchange Cricket Club.

The cricket match between the Midland Collieries XI. and the London Coal Exchange Cricket Club has been arranged for Wednesday, Aug. 25, at 11 a.m., at Kennington Oval Cricket Ground. The cost of admittance to the ground will be one shilling. In addition to this charge, tickets are available for any one who would agree to give another one shilling as donation to the Club to assist in defraying expenses.

Rotherhithe Co-Partnership Institute Gymkhana.

All the fun of the fair, with a dash of robust "he-man" stuff as typified by a sack rugby match, was to be found at the gymkhana of the Rotherhithe Co-Partnership Institute of the South Metropolitan Gas Company last Saturday. Was it the peace of mind engendered by Co-Partnership and consequent bodily health or the salubrious Rotherhithe air that enabled those who indulged in the sack rugby match and ensuing vigorous events to conclude three hours later with a whole-hearted pillow fight? The referee was the Station Engineer, Mr. T. A. Canning; M.C.'s: Messrs. J. R. Edwards and F. Pluck; Starters: Messrs. J. F. Gansden and P. Woodward; Judges: Messrs. H. P. Hollis and M. Fryer; and Field Stewards: Members of the Committee under Mr. H. Dell. Mrs. Canning presented the prizes to the winners of the various competitions.

Ulster's Public Servant No. 1

A Paper presented to members of the Irish Association of Gas Managers at the Annual Meeting of the Association held at Belfast on Tuesday, Aug. 10, under the Presidency of Mr. J. A. PEMBERTON, Manager of the Sligo Lighting and Electric Power Company.

by
EILEEN MURPHY

This summer I had the privilege and pleasure of conveying the greetings of the Irish Association of Gas Managers to some of the leaders of the American Gas Industry. They showed the greatest interest in the affairs of their Irish colleagues, and asked me to give the President their cordial wishes for a successful conference.

There is a common idea that the first thing you see as you approach America is the Statue of Liberty, pointing towards Europe. This is a mistake. The first thing you see when you pass the Ambrose Light is the Brooklyn gasholder—a sure sign that you are coming to a thoroughly civilized country.

You never lose touch with Ireland in America. The chambermaid at my hotel in New York lost no time in telling me that she came from Waterford. She was shocked when she found I had gone to America to study the Gas Industry there. "Why wouldn't you study it in Waterford?" she said. "You might have saved your money then. They tell me the Gas-Works in Waterford is going great guns." The list of gas officials in America bristles with Irish names. It looks like the index of O'Hart's *Irish Pedigrees*. And in the list, I was interested to see, is a large number of women's names.

Petticoat Rule.

In New York I visited an important gas company where the chief officials are women. The gasholder was painted green and silver. The distribution department is in the middle of a big flower garden and looks like a country club. All the architects and builders in the district go to the gas company for help in designing new houses, and especially in designing kitchens. In the gas offices there is a special room called the "soothing room," furnished like a dainty drawing-room. Customers who call to make complaints are led into the "soothing room," where a charming young man attends to them and sends them away happy. This "soothing room" system was adopted because it was found that people generally make complaints in a loud voice, and it is notorious that complaints are infectious and liable to spread to other customers. So it was decided to isolate the carriers of complaints and treat them privately. The system has been a great success, and perhaps something of the sort might be worth considering over here, though maybe there are not enough complaints to make it worth while.

There is no doubt that gas is the fashionable thing in America. The company that sells both gas and electricity in the districts round Niagara had a great investigation among a quarter of a million housewives to find out exactly what they would like to have in their homes. The company are now building three houses to incorporate the preferences of the housewives, and gas has been installed for hot water, cooking, and heating.

At our last meeting in Dublin I spoke in a very general way on the Gas Industry in the Free State, and this year the President has asked me to round off the job by giving a similar account of conditions in Northern Ireland.

In many ways Northern Ireland is an ideal district for studying the influence of the Gas Industry on the daily life of a modern community. In this compact area you find every kind of economic activity very highly developed. There are great industries with some of the biggest factories and workshops in the world; thriving ports; and holiday resorts which attract a heavy tourist traffic. Yet with all this, there is an even balance between agriculture and industry. Half the people live in towns and the other half in the country. There are nearly as many agricultural workers in Northern Ireland as in the whole of Scotland.

It is natural, of course, for the Gas Industry to flourish mainly in thickly populated districts. Yet in spite of the high proportion of country dwellers in the population of Northern Ireland, more than 60% of the total number of families have a supply of gas. In the circumstances, this is a very high figure.

Gas-Minded Ulster.

The acid test of any country's Gas Industry is not so much the number of gas consumers as the extent to which gas is used by the average family—the consumption per consumer. In this respect Northern Ireland ranks level with the chief gas-using countries of the world. Its 165,000 gas consumers use close on 6,000 million cu.ft. of gas a year. The average individual consumer uses 35,000 cu.ft. a year. This compares well with any other country. Ulster men and women are "gas-minded."

The total annual turnover of the Gas Industry in Northern Ireland is a million pounds. The net output, when deductions for the cost of material have been made, is in the neighbourhood of £500,000 per annum. The net output per person employed is £310 a year—a high figure when compared with other important industries. To appraise the value of an industry in the economic life of any country, one must consider not only its total turnover, but also its structure, its regional distribution, its relation to other industries, and the nature and extent of the employment it gives.

The Gas Industry in Northern Ireland comprises 25 distinct gas undertakings distributed throughout the country. Eleven of these undertakings are operated by local government bodies, the remaining 14 being run by companies. They range in size from village works where the total population is 1,000 or less to the immense Gas Department of Belfast which serves close on half a million people. Sixteen of the twenty-five undertakings operate in districts of less than 10,000 population.

Diffusion of Productive Units.

The twenty-five undertakings are spread fairly evenly among the six counties in proportion to the density of population. This diffusion of productive units is due to the fact that gas can be efficiently and economically produced in local works. The result is that the employment given by the Gas Industry is not concentrated in a single area, but is distributed over the whole country. Regular employment is given to 1,700 workers, and this leaves out of account the labour needed for extensions of plant and the staffs maintained by manufacturers of gas appliances. In the last few years the Ulster Gas Industry has been very active in extending its mains and building new plant.

Like other great industries in Northern Ireland, the Gas Industry has to import its raw material. Every year it carbonizes a quarter of a million tons of coal, producing high grade fuel for Ulster homes and workshops, and extracting every product that is useful to the community. Even in countries where coal is plentiful, there is to-day a strong reaction against the wasteful practice of burning coal in its raw state. In Ireland, whose native coal supplies are meagre, there are unanswerable arguments for treating coal by the most economical and productive methods known to science.

From the coal which is treated in the works, the Ulster Gas Industry extracts not only gas, but other valuable products which would otherwise have to be imported at extra cost. Each year the Gas Industry produces coke, tar, and other by-products to the value of a quarter of a million pounds.

There are no official figures to show the proportions in which gas is used by different classes of consumer. It is established, however, that more than 12% of the total output of gas is supplied to workshops and factories, and the proportion is growing. The sales of industrial gas fluctuate in direct ratio to the state of local trade, and an increasing use of gas for heat-processes is one of the surest signs of industrial prosperity. Northern Ireland has important food industries and more than 50 engineering firms, and in these trades there is everywhere a marked trend towards the use of gas as new processes demanding precision and exact control replace rule of thumb methods.

It is not only in industrial processes that gas is used on a large scale. In Northern Ireland there are more than 20,000 public lamps lighted by gas. In that respect the streets and roads of Ulster resemble the most famous streets of London. They say the streets of London are paved with gold. The only gold I ever saw there was in the light of the great gas lamps in Regent Street and Whitehall.

As an example of other big-scale uses of gas I may mention the Belfast City Hall itself. The City Hall was one of the first great public buildings in Europe to be centrally

heated by gas, and now the lead set by Belfast has been copied by many other towns.

Sales Increase 30%.

In spite of the increase in the use of gas for industry and commerce, the great bulk of the gas made in Ulster is used in the home. Since 1924 the total sales of gas have risen by nearly 30%, a figure as healthy as any country can report.* To some extent this rapid development is due to an increase in the number of consumers, for many of the Ulster gas undertakings have been busily extending their mains and services. In the same period about 30,000 new houses have been fitted with up-to-date gas appliances. The main cause of gas expansion, however, must be attributed to an increasing use of gas by the average household, and this is the real test of public satisfaction.

Ulster people may well be proud of their Gas Industry. I seem to remember that at one time there was a tendency in some quarters to speak of Ulster as "the Black North." I can only say that a country which uses gas to the full in place of raw coal can never be reproached with the grime and smoke of a "black country." They say that when the wind is in a certain direction, the smoke of industrial Lancashire is blown over the sea and the sheep on the Isle of Man go darker in colour. Well, Northern Ireland is determined to have no black sheep of that kind. To put it poetically, the Red Hand of Ulster will never clasp the black hand of the smoke fiend!

Not very long ago the abolition of smoke seemed to be as far off as the abolition of crime or the elimination of poverty. Everyone detests smoke, just as everyone detests crime and poverty. Everyone knows that smoke is a menace to health, and costs more every year than all the voluntary hospitals put together. But as long as smokeless fuels were far more expensive to use than raw coal, people were bound to go on burning coal and producing smoke. Smoke abatement came to be regarded as an ideal —a luxury that everyone would like to have as long as it could be got without paying.

To-day, however, the Gas Industry is making smokeless towns possible. In the last few years whole blocks of dwellings have been built where no coal is used, but only gas and coke. The tenants of these buildings are families who have been transferred from overcrowded slum districts. They have found that in their modern smokeless homes they need spend no more on fuel than they used to spend in their old homes, yet they are getting far better value for money in the way of convenience and comfort. Hitherto the real obstacle to smoke abatement has been the individual householder's fear of extra expense. To-day, under normal circumstances, a combination of gas and coke works out no more expensive than raw coal. This means that smoke abatement has for the first time become practical politics, and I believe that a vigorous campaign against the smoke evil would now have a very fair chance of success.

This Paper is a natural sequel to the one I gave last year, and I would like to sum up briefly on the two together, since all sections of the Irish Gas Industry are represented here to-day.

Taken as a whole, the Gas Industry in Ireland has works in 70 towns throughout the country. It has an annual turnover of more than two million pounds, and gives regular employment to four thousand men. Its working is subject to rigid regulations framed in the interests of consumers and controlling quality, measurement, prices, and dividends. Its management is in the hands of men with specialized technical qualifications. It touches the life of the community at many points, translating imported raw material into high grade fuel which is supplied to homes and factories, and producing by-products of enormous social value.

In short, from whatever point of view it is regarded, the Gas Industry is a great asset to the economic life of the country. It is an asset which will appreciate in value in proportion as the standard of living improves and as the country grows more prosperous. In fact, economists regard the Gas Industry as a reliable barometer of trade conditions, because they know that a rising curve of gas consumption means better trade and a higher standard of life into the home.

A Youthful Industry.

Though most people have some personal experience of the Gas Industry's work, comparatively few realize its full extent and importance. This is partly because the Industry has functioned efficiently for so long that its unfailing service is taken for granted. People speak of the gas business as an old industry, but as a matter of fact it is just emerging from the chrysalis. Just think of all the new gas appliances on the market to-day—automatic water-heaters, cookers with oven control, refrigerators, and so on. None of them were in existence a dozen years ago. They are all new inventions—newer than the radio or artificial silk. Why, compared with some other modern trades, the Gas Industry is just a pushing youngster.

There is another reason why people tend to under-estimate the national importance of the Gas Industry. They think of it as a group of isolated units, not realizing the extent of the co-operation which exists between members of the Industry. It is for this reason that I have tried in my two Papers to give a picture, imperfect though it may be, of the Industry as a whole, because I feel that at a time like this, when social values are changing rapidly and when the economic structure of every country is being overhauled in the light of new political theories, we should take every opportunity of giving the public a true perspective of the Gas Industry's part in the national life.

Discussion.

Mr. A. Law (Limerick) remarked that Mrs. Murphy had given them ample opportunity to feel proud of the Industry in which they were engaged, and at the root of everything was her deep sense of duty to the Gas Industry in general. The reason for her marked success seemed to lie in the fact that, whenever and wherever she spoke, she made her audience feel that they were the most important people in the Industry. They could take a lesson from this in dealing with their consumers. The way in which she treated her audience was the way in which they should treat their consumers—that was to say, they should endeavour to make each individual consumer feel that he or she was the most important consumer in the area. He complimented Mrs. Murphy, and thanked her for the very nice manner in which she had placed her Paper before them.

A Pointer.

Mr. F. J. Edmonds (Waterford) said he also would like to thank Mrs. Murphy for her Paper, which he thought might be termed an "index," or a "pointer" to what they ought to do and what they ought to strive for in furthering the interests of the Gas Industry in Ireland in the future. No doubt, if they would regard her Paper in this light, she would feel amply rewarded for the great amount of care and thought which had gone to its preparation. The Author's reference to a "soothing room" in America had rather attracted him, but she might have told them what actually happened in this room. The Paper stressed certain things which influenced the value of an undertaking. It seemed to him that goodwill was a very important factor indeed in the assets of any gas undertaking. An individual became known by his or her own personality, and an undertaking must surely also be known by its personality. If this were kept constantly in mind, the Gas Industry need not be afraid of its future.

As to "Gas-Minded Ulster," Mr. Edmonds went on, he thought they should try to make people gas-minded by supplying apparatus at the lowest possible price, and by selling gas and other products also as cheaply as possible. It was not much use for any undertaking to try to sell gas on a sentimental value only. They must get down to hard facts, and realize they had competition to meet, by selling a cheap commodity against their competitors. They should advertise more than they did the comparative costs of electricity and gas, so as to let people see that, all things considered, gas was the cheapest. In this they had one of their greatest assets, and it was an aspect of the matter which should be impressed upon the minds of their consumers as strongly as possible.

In his concluding words, Mr. Edmonds expressed regret that they lacked in Ireland one particular organization which was doing a tremendous amount of good on the other side of the channel, in helping individual undertakings to increase the uses of gas for industrial and commercial purposes. He referred, of course, to an Industrial Development Centre. They should have one in Ireland, but at the moment the nearest available one in the South was at Cardiff. To this his own undertaking was attached, and it was a great joy to belong to such an industrial group. Whatever problem he might be faced with, either big or small, he passed on to the Centre for advice. With this in mind, he ventured to ask: Should they not have an Industrial Centre like this for all the undertakings in Ireland? He put it to the meeting that they certainly ought to have such an organization to assist them in dealing with the many problems which Mrs. Murphy had shown them required attention.

Ladies to the Front.

Mr. G. Walmsley (Londonderry) said he would describe Mrs. Murphy as the principal saleswoman of the Gas Industry in these islands. She had mentioned that, in the case of one of the gas undertakings she visited while in America, the chief officials were women. It seemed to him that in course of time this might become an accomplished fact over here. At any rate, he thought that, before long, every gas undertaking with a showroom of any size would have a lady in charge possessing a diploma in domestic science, who would be capable, not only of acting as a saleswoman, but of demonstrating in public what gas could do. This would be a great asset to any gas under-

* Sales in 1924, 4,583 million cu.ft.; sales in 1936, 5,800 million cu.ft.; net output in 1924, £391,000; net output in 1935, £515,000.

taking. In a country like theirs, of course, it would not be so easily accomplished as over the water, but it should be possible to organize a system of co-operation whereby the smaller undertakings would be able to avail themselves of the services of such a lady for short periods at a time. Perhaps one of the national organizations might, in the near future, look into the question of whether they could not provide a course of study by means of which lady members on the sales staff would be able to secure a certificate or diploma which would enable her to offer her services as qualified both to demonstrate on gas appliances and to sell them to potential customers. It would be a great advantage to every undertaking to have the services of such a lady at disposal. They always looked for something good from Mrs. Murphy, and again that day they had not been disappointed.

Mr. J. RICHMOND (Penicuik) asked Mrs. Murphy whether the average consumption per consumer of 35,000 cu.ft. of gas a year in Northern Ireland included industrial consumers as well as domestic. If so, it was rather misleading. He had greatly enjoyed listening to the Paper.

The "Soothing Room."

Mrs. MURPHY, replying to the remarks that had been made, said the average individual consumption did include industrial uses. Statistics of this character were one of the things in which the Gas Industry was sadly lacking. Mr. Edmonds, in referring to her Paper as an index, no doubt meant that she was more or less pointing the way. She always believed in picking out the high spots, and showing people what to work up to. This was what they should do in connection with their own undertakings. With regard to her visit to the "soothing room," she recalled that it was a very hot day, and the air was beautifully conditioned. A young man brought in a consumer who was complaining of her high monthly gas bill—accounts were rendered monthly out there. He referred to various special occasions that might have arisen during the period, and at last she recollected a large party she had had, which must have accounted for an additional consumption of gas. Mr. Edmonds had referred to the necessity for cultivating goodwill. She certainly put goodwill before anything else. They should treat customers as they would treat anybody they thought important, because the customer was important. To make people "gas-minded" should be their first object. Cheap gas and cheap appliances were matters for Directors and Committees who were able to formulate policy. The abolition of smoke must be a gradual process. It was being eliminated by degrees.

The question of an Industrial Development Centre was very important, and she certainly hoped that one would be started in Ireland. When the results of the Institution Examinations were published this year, she was interested to see that there was one woman's name among all the men. This was a very pleasing feature, because there were many problems about which women knew most. As to demonstrators and saleswomen, it seemed to her that it would be easy for the larger undertakings to engage a floating staff, who could be sent out as required. Here the appliance manufacturers were doing important work in this respect, which she did not find the case in the United States. To her mind, the woman demonstrator should have had a domestic science course. To get a training on the salesmanship side she should go on the works or district. A fault in the past was that the average demonstrator knew how to teach, but not how to sell. She should be able to earn whatever she was costing the undertaking. To give the whole of her attention to cookery, and none to the selling of the apparatus with which she was demonstrating, was wrong.

Electric Welding

AS APPLIED TO GAS WORKS PLANT

by
H. H. HOLLIS

A Paper presented to members of the Irish Association of Gas Managers at the Annual Meeting of the Association held at Belfast on Tuesday, Aug. 10, under the Presidency of Mr. J. A. PEMBERTON, Manager of the Sligo Lighting and Electric Power Company.

It is my intention to deal only with work which has come directly under my supervision. My subject will be dealt with under two heads:

(1) Repairs.
(2) New plant.

Repairs.

I propose to deal specially with gasholders, as I know of no more important gas-works plant, where welding can be of greater service to the Gas Industry in carrying out repairs, than gasholders, whether in commission or out of commission.

First, I will deal with welding repairs on gasholders in commission. Before discussing various jobs, I would like to deal with that part of the new Factories Bill which concerns this work. Clause 28, subsection 4, reads:

> "No plant, tank, or vessel which contains or has contained any explosive or inflammable substance shall be subjected to any welding, brazing, or soldering operation or to any cutting operation which involves the application of heat, until all practicable steps have been taken to remove the substance and any fumes arising therefrom, or to render them non-explosive or non-inflammable; and if any plant, tank, or vessel has been subjected to any such an operation as aforesaid, no explosive or inflammable substance shall be allowed to enter the plant, tank, or vessel until the metal has cooled sufficiently to prevent any risk of igniting the substance."

Immediately my attention was called to this, I communicated with the Under-Secretary of State for the Home Office, pointing out that my firm had had many years' experience of the welding of gasholders without removing the gas, and have carried out numerous such operations without the slightest danger of any accident. The pressure of the gas prevents any risk of air entering the gasholder and thus creating an explosive mixture, which might, however, arise if attempts were made to remove the gas before welding. Particulars of welding repairs carried out by my firm were passed on to the Home Office. During the debate on the Factories Bill on Wednesday, June 16, 1937, Mr. Lloyd, in moving an amendment to Clause 28, subsection 4, stated:

> "We want to have the power for the chief inspector to give exemption in regard to Subsection 4 as well as Subsection 3. Under Subsection 4, no plant containing inflammable substance shall be subjected to any welding operation until all practical steps have been taken to remove the substance and any fumes arising therefrom, or to render them non-explosive or non-inflammable. It appears that welding operations are and may be carried out on gasholders, and on similar plant safely even if the holder is full of gas. The difficulty we have found is that there would be an actual increase of danger if an attempt were made to empty the gasholder before the welding operations took place. It is a point which will be familiar to anyone who is trained in chemistry, that the real danger arises when you get a mixture of gas and air."

The amendment was agreed to.

Of Importance to the Gas Industry.

This is of vital importance to the Gas Industry. By welding only, is it possible to carry out extensive repairs —amounting to practically completely resheeting in some cases—on gasholders in commission. It will be appreciated that this is highly specialized work.

The majority of the repair jobs described by the Author were illustrated by lantern slides.

Case 1. This is the only gasholder in the works. Single lift, 49 ft. diameter by 12 ft. deep. The crown sheeting was in a bad condition and part of the intermediate side sheeting in an extremely bad condition, with a considerable amount of leakage. (It is important to note that small leaks which, in the aggregate, equal a hole ¼ in. in diameter, would account for a loss of 1,609,200 cu.ft. per annum in a gas-

holder throwing a pressure of 6 in.) The top and bottom rows of side sheeting on this holder are in good condition. New sheets, ⅛ in. thick, were welded to the sides and crown, the holder being in commission the whole of the time. Before fixing the new sheeting, the old sheets were covered with "Limpet" asbestos, all leaks being efficiently sealed. To give the necessary pressure, the old crown was loaded with bricks, cast-iron weights, and pipes. These have been dispensed with.

Case 2. This is a three-lift spiral-guided holder in steel tank, 90 ft. diameter. The outer lift dip skirting plates had split opposite the toe of the channel. The fractures were under the rollers and carriages, suggesting excessive strains at these points. New ¼ in. thick plates were welded over the existing skirting plates, between the beading and the rivet heads. The inner lift was in commission. Great care had to be exercised in carrying out this work.

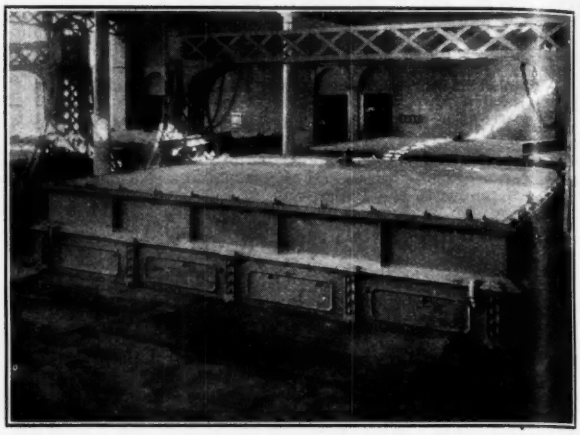
Construction of Inner Lift, showing Vertical Stays and Angle-Purlins on the Sale Gasholder.

Case 3. This holder is a three-lift, column-guided, flying inner lift, 95 ft. diameter. There are twelve top carriages, of a very heavy design. The pressed steel base plates had corroded to such an extent as to make the working of the holder positively dangerous. The old base plates were removed. A small steel disc was welded over each of the 216 bolt holes—18 per carriage—12 new carriage plates each 3 ft. 10 in. by 2 ft. 6 in. by ⅜ in. thick, were welded to the existing crown carriage plates. On to each of these was welded a pair of 4½ in. by 4½ in. by ½ in. steel angles 2 ft. 9 in. long with suitable stiffeners. These formed a base or stool for receiving the top carriages.

A steel panel 5 ft. 6 in. by 2 ft. 6 in. by 12 gauge was welded to the side sheeting of the inner lift, covering numerous bolted patches which were leaking badly. Other small patches were welded on to the inner lift sheeting.

For the last eight years it has not been possible fully to inflate this holder owing to a punctured sheet. The rent is 2 in. to 4½ in. wide by 24 in. deep. This was successfully covered by a welded steel panel 3 ft. 3 in. by 2 ft. 1 in.

Case 4. The gasholder is 1½ million cu.ft. capacity, three-lift, spiral-guided. Four hundred and thirty patches varying in size from 4 in. square to 72 in. by 30 in. were welded on this holder, the total welding being 1,568 lineal ft. Practically every conceivable form of patch was employed.



A Purifier Converted by Arc Welding to Dry Seal, the Capacity being increased at the same time.

Case 5. This concerns repairs to the steel tank, 100 ft. diameter, for a three-lift gasholder. Rust had formed between the steel channels of the standards and the tank side plates. In places the plates are corroded to the full thickness. New panel plates were welded over the existing plates with the water in the tank and the gasholder in service.

The above cases serve to illustrate the important part welding plays in executing repairs of considerable magnitude to gasholders continuously in service. As previously stated, it is specialized work. There should be no danger of explosions. I believe I am correct in stating that statistics prove that the majority of accidents in gas-works occur when the plant has been out of commission. This refers particularly to gasholders.

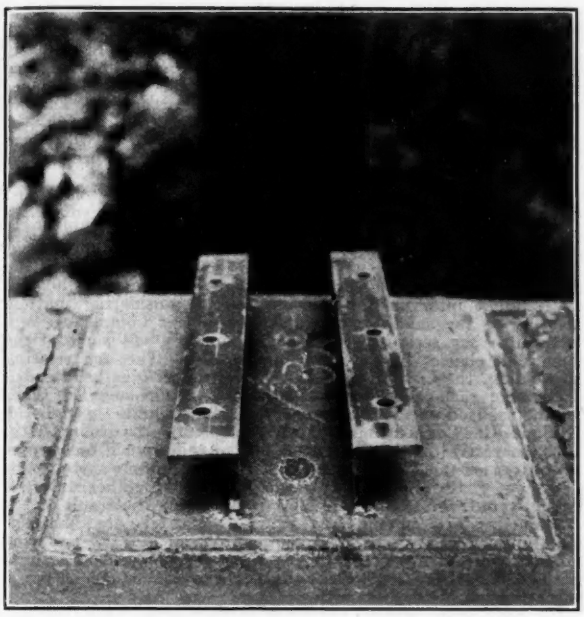
The following cases deal with welding on gasholders out of service:

Case 6. This is a two-lift gasholder, inner lift 58 ft. 6 in. diameter. It was completely re-sheeted and the framework re-conditioned.

Base Plates removed from Undercarriages of old Gasholder.

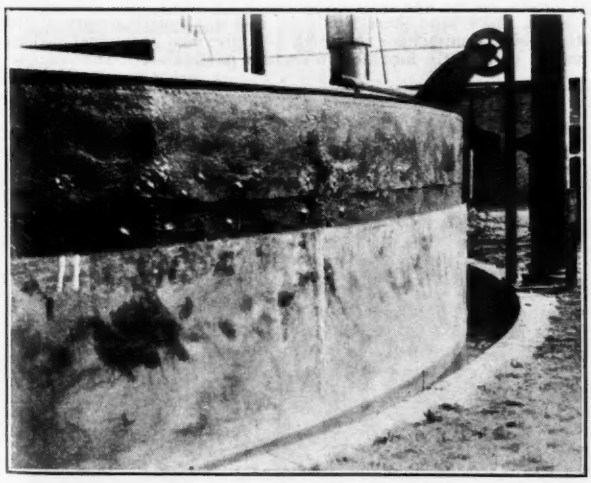
Case 7. Single-lift holder in steel tank 44 ft. 6 in. diameter. The lift was completely re-sheeted, framing re-conditioned, new platform supplied to the tank. The bottom tier of side plates on the tank badly corroded. A complete new course was welded over the existing plates. There was excessive corrosion on the top tier of plates at the water line. Plates were welded over the affected parts.

Case 8. A welded crown of a 62 ft. diameter holder. After removing the old sheets it was observed that the top curb underneath the carriage bed plates had corroded very badly until the thickness on the root of the angle was only about ⅛ in. The angle was restored to its original thickness by welding. The old bed plates were dispensed with. Supports for the top carriages were welded on to the carriage plates.



Improved Form of Base Blocks for Carriage.

Case 9. A new cup plate was welded around the full circumference of the inner lift of a two-lift gasholder. The bottom edge of the new plate was welded to the toe of the cup channel. The space between the inner lift shell and the outer lift dip skirting plates was only 3½ in. The work was carried out with the water in the tank. To empty the tank would have necessitated pumping the water into a disused quarry about a quarter of a mile away.



Showing the Addition of a new Crown Plate to a Gasholder.

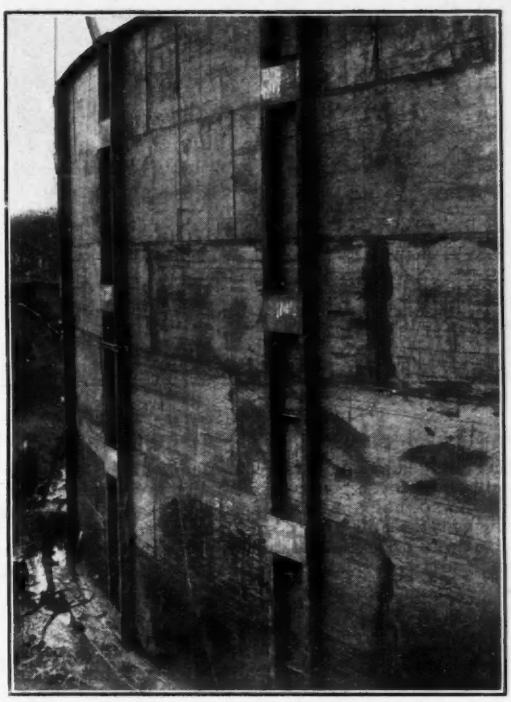
The above few illustrations serve to demonstrate the advantages of electric welding over riveting in connection with repairs to gasholders. Furthermore, the time and money saved by the welding method is considerable, and of great importance to gas undertakings.

New Plant.

The largest welded purifying plant erected at any gas-works in this country are at Stretford, near Manchester. There are four boxes, each 40 ft. by 30 ft. by 12 ft. deep, with supporting structure. The bottom and gangway plates are of ¼ in. thick mild steel plates. The sides, ends, and divisions are of ⅛ in. thick copper-bearing plates. There are four welded covers to each box 15 ft. 4½ in. by 12 ft. 4½ in. In the welded construction great flexibility is obtained and the risk of cracked plates—so common in the cast-iron design—and the attendant danger of fire is entirely eliminated. The inside surfaces of the steel sides, ends, and divisions and the underside of the gangway plates are coated with sprayed "Limpet" asbestos. The insulation of the underside of the covers was also done with sprayed "Limpet" asbestos. Another purifier installation was an extension to a purifier plant of the standard cast-iron construction. The extension consisted of two boxes, each 30 ft. by 30 ft. by 6 ft. deep, constructed of mild steel plates electrically welded throughout. Bottom plates were dispensed with, the concrete foundations forming the bottoms for the purifiers.

The side, end, and division plates were constructed of ⅛ in. thick mild steel plate panels, with suitable stiffeners, the whole being anchored to the concrete foundations.

The gangway plates were constructed of ⅛ in. thick mild steel plates electrically welded throughout. Four covers of welded construction were supplied for each box. A rail track was welded to the top of the gangway plates to accommodate the existing travelling cover lifting crane.



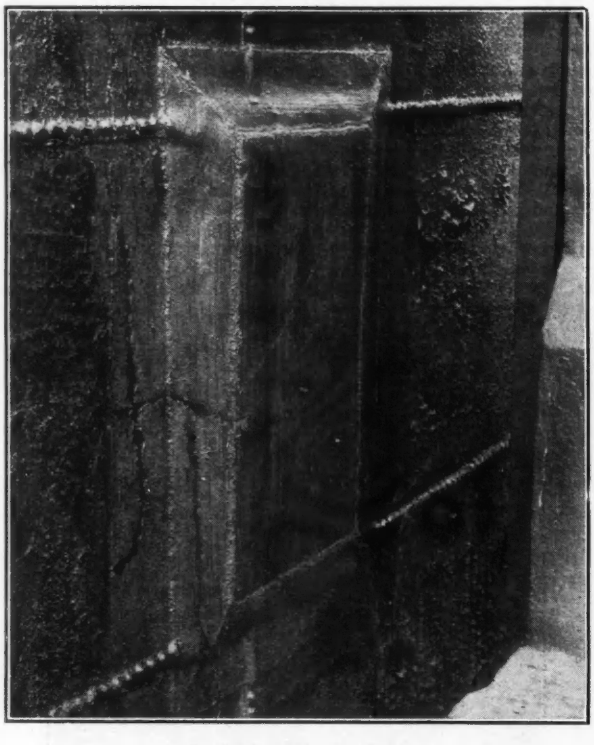
The Vertical Stiffener Frames on the Sale Gasholder Tank.

At the moment the largest spiral-guided welded gasholder built in this country has the following dimensions:

Inner lift	61 ft. 9 in. dia.	× 25 ft. 0 in.	deep
Second lift	64 ft. 2 in. ,,	× 25 ft. 0 in.	,,
Future third lift	66 ft. 8 in. ,,	× 25 ft. 0 in.	,,
Steel tank	69 ft. 0 in. ,,	× 25 ft 6 in.	,,
Present capacity	150,000 cu ft.		
Future capacity	230,000 cu.ft.		

The sides of the lifts are constructed on a patented system, all sheets being fixed at an angle of 45°. Location holes are provided in the spiral rail plates, but there are no holes in the intermediate sheeting, therefore no sheets are forced into position. All seams in the side sheeting are continuously welded both inside and outside. The welding on the outside is semi-downhill, and on the inside semi-overhead. The circumferential purlins which are additional to the orthodox riveted design, and are embodied in the patent, are curved to the radius of the lifts, and fitted between the vertical stays, keeping the frame perfectly true to shape. The rail plates are tack welded on the inside to the purlins and the vertical stays. This prevents distortion in heavy gales. The spiral rails are welded to the rail sheeting continuously on both edges. This makes it impossible for water to lodge or get between the rails and rail plates. The rails are fixed true to position without the aid of location holes.

All carriages (four-roller and two-roller type) are of the self-adjusting and self-lubricating type and are constructed on a patented system. Immediately this gasholder was put into commission exceedingly heavy gales prevailed at times reaching the velocity of 70 miles per hour; during this period and while the gasholder was fully inflated it was held perfectly rigid and, due to the fact that the rollers were of the self-adjusting type, no undue stress was placed on the internal framing and dips.



Patch Over Lift Sheeting.

Other welded gasholders from 19 ft. diameter to 59 ft. diameter have been constructed under my supervision, but call for no special comment except that each holder is perfectly gas-tight and giving satisfactory service.

A two million cu.ft. capacity welded gasholder is now under construction at Sale, Cheshire. The dimensions are:

Inner lift	141 ft. 0 in	dia. ×	31 ft. 8 in. deep
Second lift	144 ft. 0 in.	,, ×	31 ft. 8 in. ,,
Third lift	147 ft. 0 in.	,, ×	31 ft. 8 in. ,,
Outer lift	150 ft. 0 in.	,, ×	31 ft. 8 in. ,,
Steel tank	152 ft. 6 in.	,, ×	33 ft. 0 in. ,,

This is being constructed on the patented system described above.

The total weight of the steelwork is approximately 880 tons. The electrodes placed end to end would cover about 57 miles. The bottom plates of the tank are $\frac{3}{4}$ in. thick throughout and the side plates vary in thickness from 31/32 in. to $\frac{3}{8}$ in. Upon completion the tank was true to diameter to within three-quarters of an inch.

The sides of all lifts are constructed of $\frac{3}{8}$ in. top and bottom rows and $\frac{3}{8}$ in. plates, with 3/16 in. and 10 gauge thick intermediate sheeting. The crown sheets vary from $\frac{3}{8}$ in. to 11 gauge thick.

The maintenance costs for a holder of this design are considerably reduced and there are no potential leakage or corrosion points. There have been many gasholder disasters in which it has been very difficult to state definitely the causes. It is reasonable to assume, however, that in some cases the cause of the disaster may be attributed to the sheeting corroding at the lap edge of the riveted seam. This seam eventually breaks owing to strains thrown on the seams consequent upon the unsteady working of the gasholder. In the breaking a spark is caused which ignites the gas, resulting in the holder being burnt out. In my opinion this could not happen with welded seams. On the crown of the bell no water could lodge at the edges of the sheets because of the welding fillet.

In these days I consider it to be bad practice to use tape for the purpose of making the seams of gasholders gas-tight. In connection with this type of jointing it is interesting to note that a 180 ft. diameter gasholder bell is to have the riveted seams covered by welded joggled cover strips—a total length of about 17,500 ft.—owing to defective riveted seams. The sheeting appears to be in a good condition.

In general terms it is my considered opinion that electric welding is to be preferred to riveting for any type of gas-works plants constructed of mild steel plates. Furthermore, the cast iron work used in purifiers and other plant can, with advantage, be replaced by welded steelwork.

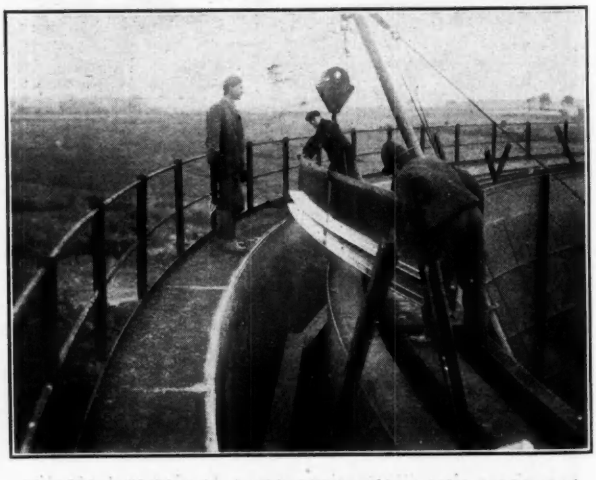
Discussion.

Dr. W. T. K. Braunholtz, having expressed appreciation of the kindly welcome which had been accorded him, remarked that it gave him great pleasure to make this first attendance at a meeting of the Irish Association. Unfortunately, another engagement had made it impossible for Mr. H. C. Smith, the President of The Institution of Gas Engineers, to be with them that day, and he (the speaker) wished officially to present his regrets.

Referring to the Paper and pictures which they had just enjoyed, Dr. Braunholtz said there was much in the subject of gasholders and their depreciation which was of very great interest to him personally. As most, if not all, of those present were doubtless aware, there was in active existence in The Institution of Gas Engineers a Gasholder Committee, who met at frequent intervals for the purpose of considering matters relating to the safety of gasholders; and this Committee were naturally very seriously concerned when they saw some of the suggested clauses in the new Factory Bill. The one relating to welding, the Committee believed, was not originally intended to involve gasholders, but in its wording it did so. The Committee realized the implication of the clause, and, through the National Gas Council, immediately protested to the Home Office. Representatives of the Committee and of the Council met representatives of the Home Office, when opportunity was taken to point out that a holder full of gas was an altogether different proposition from a tank half full of petrol. As the result of the combined efforts of the Institution Committee, the National Gas Council, Mr. Hollis, and perhaps others also, it was now possible for the Inspector to grant exemptions in the case of gasholders. There were other clauses also which had occupied the attention of the Committee.

He went on to remind the meeting that some few years ago this Gasholder Committee produced their first report, in which they stressed the vital importance of gas engineers regularly inspecting and maintaining the condition of their holders. That report, Dr. Braunholtz said, contained recommendations as to the keeping of records of inspections made, and so on. As a matter of fact, a number of gas engineers were already doing this, and on the issue of the report some others adopted the suggestion, but unfortunately by no means 100%. Then last autumn the Committee published their third report, in which attention was again drawn to the subject, and reference was made to pending legislation. It was felt then that, if the Industry as a whole adopted and put into force the recommendations of the Committee in respect of holder inspections, it might be possible to avoid this legislation. Nevertheless, in spite of the representations made on behalf of the Institution, a special clause was inserted in the Act dealing with gasholders.

In a short time there would be issued a fourth report of the Gasholder Committee, in which the previous recommendations would be slightly modified in certain particulars. The requirements of the relevant clause in the Factories Act were not actually more stringent than these recommendations of the Gasholder Committee. The Committee were also arranging for the issue on sale to the Industry of standard sheets on which inspections, &c., could be recorded. It was deemed advisable to have the sheets in a standard form, so that the necessary information might be most readily available to the inspector



A Section of the Bottom Curb of the Fourth Lift being lowered into position on the Sale Gasholder.

when he came round, as he would do. These sheets were now in the hands of the printers, and it was hoped that in a few months they would be ready for distribution. He would strongly urge everyone to adopt the recommendations of the Committee, and record the results of their inspections on these standard forms.

Mr. P. J. MacEvoy (Midleton) said they owed a debt of gratitude to Mr. Hollis for having contributed one of the most interesting Papers the Association had ever had. He had put forward a definite case for welding, and in all probability had made up the minds of his audience in favour of his system of gasholder construction. The whole thing had been a revelation to them. They had had put before them a system which was both effective and mobile. He (the speaker) would like to relate an experience of his own some years ago with the tank of a spiral-guided holder. The tank was built on props, and the results of the job did not make him an ardent advocate of riveting. It proved necessary to replace a number of the rivets, so that in this particular instance the human element proved not to be infallible.

Mr. A. Law (Limerick), referring to the actual welding material used, asked whether this was as strong and reliable as the plate itself. As to patching by electric welding, was this of the kind in which the patch was sometimes stronger than the surrounding material, so that the load became unequal?

Mr. W. E. Young (Queenstown), referring to new construction work, said it appeared to him that if one could weld a steel tank on the bottom side as well as on the top side, it ought to go far to make it a good strong job. The Paper was a most valuable one.

Look to the Gasholders.

Mr. Hollis said he recognized that this was a highly technical subject, but it was one about which he was very enthusiastic, and had been for the past twenty years. He had been associated with gasholders for nearly forty years. His view was that it was up to the contractors to try to give the Industry better plant. Engineers endeavoured, through their showrooms, &c., to do everything possible to attract the public to use their commodity, and he was afraid that most of their time was taken up in this particular work, and that they were apt to leave it to the contractors to improve as far as they could the design and construction of their manufacturing plant. Many improvements had been made in the retort house; very few had been made in connection with the design and construction of purifiers and gasholders, and it was a very poor argument to say to-day that what was good enough for their fathers was good enough for them. There were splendid examples of riveted holders which were giving excellent service over many years; but there were also some horrible examples, and the loss to the Industry from leakages was enormous. Therefore he would like to support what Dr. Braunholtz had said about the work of The Institution of Gas Engineers Committee. They should follow their advice, and look to their gasholders. He was glad to find that Mr. MacEvoy was evidently favourably impressed with welding. Mr. Law had raised an important point, but it was fairly obvious that a man expert in his work would not attempt to weld a new patch to unsuitable old sheeting. It was easy for the welder to find out whether he was doing good work on the old sheeting. There was a limit to the application of welding to old sheeting. He put it at 14 gauge, but he had seen good work on 16 gauge. It needed a very skilled worker, however, to weld 12 gauge on to a 16 gauge old sheet. There was a danger of the old plate giving way adjacent to the weld. It was for the expert to decide whether an old sheet was in a fit condition to weld new patches on it. With regard to Mr. Young's query, they did weld underneath a tank bottom. His system was to put a full fillet inside, and then to put a lighter fillet underneath, to prevent moisture getting in. This type of joint was to be preferred to riveting.

He would like to thank Mr. Arundel for coming over to the meeting. He had been responsible for taking the photographs and making the films shown.

Gas Undertakings' Results

Kirkcaldy.

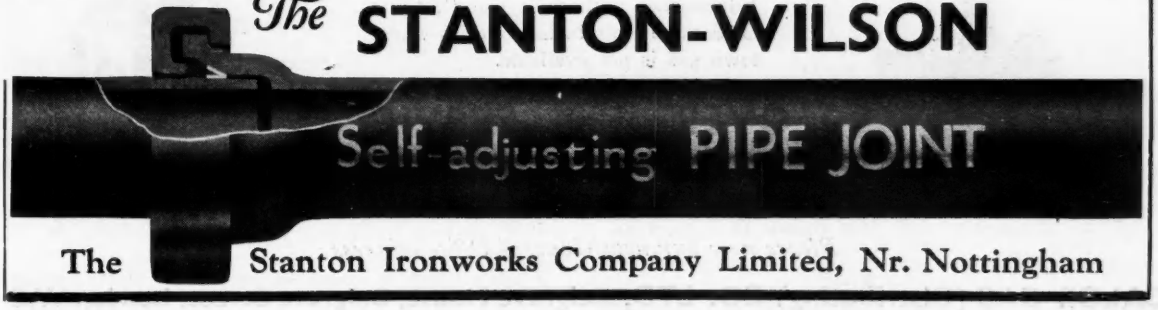
The annual report of the Engineer and Manager of the Kirkcaldy Gas Department, Mr. James M. Dow, for the year ended March 31, 1937, states that expenditure on the revenue account amounted to £36,843 and income to £51,351, giving a gross profit of £14,509. To this balance there falls to be added a sum of £6 for interest on consumers' deposits, bringing the income at net revenue account up to £14,514. From this sum is deducted payments for interest on loans, contribution towards liquidation of debt, income-tax and loans fund, expenses, a contribution to the reserve fund and one to bad debts reserve, amounting in all to £13,124, leaving a surplus of £1,390 on the year's accounts. The quantity of gas manufactured during the year amounted to 266,329,000 cu.ft., being an increase over the previous year of 34,287,000 cu.ft., or 9·5%, this substantial increase being largely due to the acquisition of the Dysart Undertaking. The average yield per ton of coal amounted to 19,527 cu.ft. of gas. The net income from residuals amounted to £6,851, equal to 9s. 10·62d. per ton of coal carbonized, or 47·3% of the cost, making the net cost of coal 11s. 0·13d. per ton.

Traffic Vibration
Rigid or Self-adjusting Joints?

Not many of the problems brought into being by the remarkable growth of road transport during the last decade are capable of easy solution.

There is at least one exception, however. For instance, though much has been heard of the danger caused to historic buildings by traffic vibration, the harmful effects of such vibration on water and gas mains are not so apparent. To water and gas engineers responsible, however, for the maintenance of these essential public services, this was a very real problem until a few years ago, for rigidly-jointed mains could not be expected to withstand the severe vibration caused by modern conditions.

Some six years ago the Stanton Company introduced the Stanton-Wilson Self-adjusting pipe-joint to overcome this and similar difficulties. That it has successfully done so is proved by the fact that more than 1,500 miles of Stanton-Wilson mains have now been laid by over 750 public authorities.



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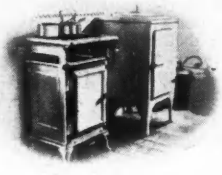

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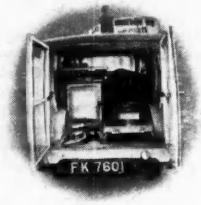

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REGULATIONS GOVERNING

The Installation of Gas Service Pipes, Supply Pipes, and Appliances

Issued by The Institution of Gas Engineers with the collaboration of the British Commercial Gas Association, the Gas Companies' Protection Association, the National Gas Council, and the Society of British Gas Industries, and with the approval of the British Gas Federation.

INTRODUCTION.

These Regulations relate to the materials to be used, methods to be adopted and conditions to be observed when laying gas services, piping premises for gas and fixing gas-burning appliances. They enumerate the main requirements and precautions for ensuring economical and satisfactory results as applied to the gas equipment of domestic buildings.

These Regulations are not intended to take the place of detailed specifications but to serve as a guide to the main points to be observed by those arranging and responsible for gas installations, and as supplementary to any statutory regulations.

Local considerations of gas supply and distribution may require additional local regulations, about which full information will be furnished by the Gas Undertaking on demand. In particular, it is to be noted that these Regulations refer to the distribution of gas under ordinary pressure. Where gas is supplied under higher pressure, the local Gas Undertaking should be consulted.

Definitions.

In these Regulations:

(i) The words "Service Pipe" mean the pipe between the gas main and the meter.*
(ii) The words "Supply Pipe" mean every pipe between the meter* and the gas apparatus in the premises.
(iii) The word "Undertaking" means the local Undertaking responsible for the supply of gas.

SECTION I.

SERVICE PIPES.

1. Laying of Service Pipe.

The service pipe shall in all cases be laid, altered or removed by the Gas Undertaking.

2. Control Valve.

Where the service pipe is of an internal diameter not less than 2 in., a suitable control valve shall be fitted in the highway by the Gas Undertaking and its position shall be clearly indicated by means of a suitable cover. To ensure that it is maintained in satisfactory condition, the valve shall be operated at least once per annum.

3. Materials for Service Pipe.

Where wrought iron, mild steel, cast iron or copper pipe is used it shall comply with the British Standard Specifications appearing in Schedule I. Where wrought iron is used it shall in addition comply with the Specification of The Institution of Gas Engineers in regard to Wrought Iron Tubes.†

SECTION II.

METERS.

4. Fixing.

All meters shall be fitted plumb and level. All meters, both primary and subsidiary, shall be provided with an approved type of main cock or valve. The main cock shall be in an accessible position and fitted on the service pipe as close as practicable to the inlet connection to the meter. No part of the cock shall be less than ½ in. clear of the wall. Where there is a detachable key, it shall be securely fixed by means of a grub screw or split pin.

Small meters shall be securely fitted with lead pipe connections and brass unions complying with the Specifications required in Clause 8, or with other types of connections approved by the Undertaking.

Meters may be provided with by-passes as the Undertaking may decree, in a manner approved by the Undertaking. All such by-passes shall incorporate approved types of inlet, outlet and by-pass valves. The by-pass valve shall be secured in a manner approved by the Undertaking and shall bear the seal of and be sealed by the Undertaking.

Where required meters, both primary and subsidiary, shall be provided on the outlet connection with a plugged point approved by the Undertaking for the purpose of taking pressure and testing.

Any meter upon which the charge for gas is based shall be fixed by the authority and under the supervision of the Gas Undertaking, and the position and size of such meter shall be approved by the Gas Undertaking.

5. Position.

Every primary meter to be used in new premises, or in premises not previously supplied with gas, or in connection with a new or substituted pipe laid from the main, shall be placed as near as practicable to the Undertaking's main, but within the external wall of the main building.

In the case of any premises in connection with which there is provided outside the building a separate, specially constructed meter house, or other suitable accommodation for the location and satisfactory protection of the meter, subject to reasonable approval by the Undertaking, the meter may be placed in such meter house or accommodation instead of within the external wall of the main building.

Meters shall be so fixed that the meter and connecting pipes are prevented by spacing, insulation or other means from coming into contact under any circumstances with electrical conduits or any other metallic conductor.

Meters shall not be fixed so as to subject them to artificial heat or wide extremes of temperature. Where meters are fitted at floor level, they shall be adequately protected.

The following locations are specifically prohibited:

(*a*) Immediately above any heating or cooking appliance.
(*b*) In the open.
(*c*) Under draining boards, or display slabs in butchers' shops, fishmongers' shops and similar establishments.
(*d*) Against damp walls.
(*e*) In any other position in which the meter is likely to suffer damage or be exposed to adverse conditions likely to affect its accuracy or safety.

SECTION III.

INTERNAL OR CARCASS PIPES.

6. Vertical Pipes.

Where steel or iron pipes are used, elbows shall not be employed at the bottom of the vertical pipes, but a T-piece and plug shall be fitted to facilitate the removal of any obstruction which may occur.

7. Size.

All pipes shall comply with the requirements set out in Schedule II.

8. Materials.

Materials and fittings shall comply with the Specifications in Schedules III and IV.

Where placed underground or in exposed positions, steam

* The word "Meter" means, for the purpose of these Definitions, every meter on the registration of which the Gas Undertaking is entitled to base its charge for gas.

† Wrought Iron Specifications (Publication No. 12 of The Institution of Gas Engineers).

weight shall be employed and the pipes shall be protected against corrosion in a manner approved by the Gas Undertaking. Where the pipes pass through or are embedded in composition flooring they shall be protected against corrosion by a suitable lead sleeve.

All ferrous tubes and fittings shall be tested by the manufacturer or the contractor or the Undertaking at an internal air pressure of 100 lb. per square inch while submerged in water, and a certificate shall be obtained that such a test has been successfully passed.

All non-ferrous tubes and fittings shall be tested in similar manner to a pressure of 100 in. water gauge, and a certificate shall be obtained that such a test has been successfully passed.

In the case of lead and composition pipes, agreed lengths shall be tested in the manner specified.

9. JOINTS.

The threads of all pipes, tubulars and fittings shall be British Standard Pipe Threads complying with British Standard Specification No. 21-1909.

Screwed joints shall be securely made after the application to the male threads of a suitable jointing compound.

SECTION IV.

TESTING.

10. TESTING OF INTERNAL OR CARCASS PIPES AND FITTINGS FOR SOUNDNESS.

The internal or carcass pipes, when installed, shall be sound and shall show no loss of pressure when tested in the following manner:

> The ends of the pipe shall be capped, with the exception of one which shall be fitted with a T-piece carrying a cock on one outlet and a pressure gauge on the other. Air shall then be pumped into the pipe until a pressure of not less than 6 in. water gauge is registered on the pressure gauge. The cock shall then be shut and, after allowing 5 min. for adjustment of temperature, the pressure in the pipe shall remain constant for a further period of not less than 5 min.

Individual Undertakings may require a higher pressure and/or a longer period of time for this test.

SECTION V.

CONNECTIONS FOR PORTABLE APPLIANCES.

11. FITTINGS AND TUBING.

Metal nose cocks and similar fittings to which push-on rubber connections can be attached should not be used unless provided with a suitable safety device. There should be fitted to the pipe supplying gas to the appliance a control tap of the bayonet type complying with British Standard Specification No. 570-1934, or a suitable safety device which must have the approval of the Undertaking.

Where flexible tubing is provided it shall conform to British Standard Specification No. 669-1936, or be approved by the Undertaking.

SECTION VI.

GAS APPLIANCES.

12. APPLIANCES.

No gas appliance shall be installed or used unless it is capable of passing the combustion tests prescribed in British Standard Specification No. 717-1936.

13. GAS RATE.

The gas rate and other adjustments, if any, shall be such as to enable the appliance to fulfil the requirements of British Standard Specification No. 717-1936.

SECTION VII.

VENTILATION OF APPLIANCES.

14. VENTILATION OF ROOMS.

Hygienic requirements in occupied rooms can be ensured only by the provision of adequate ventilation. Such ventilation can best be obtained by the provision of flues. Where flues are not provided, Building By-laws generally require some other permanent means of ventilation.

15. ROOM HEATING APPLIANCES.

Gas appliances for the heating of rooms are of two types, those designed to promote ventilation as well as heating and those designed for heating purposes alone:

(*a*) *Ventilating Heaters.*—The normal type of gas fire is designed to promote ventilation simultaneously with the heating of the room and must therefore be used in conjunction with a flue.

(*b*) *Non-Ventilating Heaters.*—The majority of non-ventilating gas heating appliances are designed to be used fluelessly as auxiliaries to other forms of heating. Their continuous heat input to the room shall not exceed 500 B.Th.U. (gross) per hour per 100 cu.ft. of room space. In halls, passages and shops, where ventilation is generally greater than that normally obtaining in living rooms, it is permissible to increase this continuous heat input up to 500 B.Th.U. (gross) per hour per 50 cu.ft. of room space.

16. PROVISION OF FLUES.

The need for flues is determined by the gas consumption and period of use. In order to avoid the production of uncomfortable conditions in the room, flues connected with the outside air shall therefore be used with the following water-heating appliances:

(*a*) *Rapid Water-heating Type,* used for the heating of water for a bath.

(*b*) *Storage Type,* having gas burners generating more than 15,000 B.Th.U. (gross) per hour.

(*c*) *Central Heating Type.*

(*d*) *Wash Boilers, Washing Machines or similar Appliances,* having gas burners generating more than 20,000 B.Th.U. (gross) per hour.

(*e*) *Any Appliance fitted in a Bathroom* for heating water for a bath, having gas burners generating more than 500 B.Th.U. (gross) per hour per 35 cu.ft. of room space. Every such bathroom shall in addition be provided with adequate means of ventilation to the outside of the room by sufficient aperture or air-shaft having an unobstructed sectional area of not less than 15 sq.in.

Many gas water heaters embody in their construction a baffler or downdraught diverter which prevents downdraught affecting the combustion in the appliance. Every water-heating appliance not so constructed, but connected by a flue to the outside air, must have a baffler or downdraught diverter fitted to it in the same room as the appliance itself. All bafflers or downdraught diverters, whether embodied in the appliance or installed as independent fittings, shall comply with British Standard Specification No. ——*

Flues connected to the foregoing water-heating appliances may be arranged to terminate inside a well-ventilated roof space, provided adequate precautions are taken to prevent condensation occurring or excessive drying of woodwork by heat.

Note:

> All water-heating appliances, whether fitted with a flue or not, shall be so placed as to ensure under all conditions a supply of air sufficient to support combustion.
>
> All water-heating appliances not fitted with a flue shall be so placed as to ensure the free discharge of the products of combustion.

17. SIZE OF FLUES.

Since no soot is produced, the size of the flue may be dimensioned to the actual requirements. On short flues not exceeding 12 ft. in length, the cross-sectional area of the flue shall be not less than that of the flue spigot on the appliance.

Where the flue is used in conjunction with a gas fire, and is chiefly provided for the purpose of general room ventilation, the cross-sectional area of the flue shall preferably be not less than 1 sq.in. per 100 cu.ft. of room capacity. On short flues not exceeding 12 ft. in length, the cross-sectional area of the flue shall be not less than that of the flue spigot on the appliance, nor less than 1 sq.in. per 1,000 B.Th.U. (gross) per hour generated by the gas burners in the fire. In any case the minimum dimension of the flue shall be not less than 2 in. on a horizontal section. The full area of the flue must be maintained throughout its length. No flue shall be considered to fulfil these Regulations if the area shall be restricted by the extrusion of any jointing material.

* In preparation.

These requirements also apply when a pre-cast concrete block flue is used.

Double concrete flue blocks can be built within the thickness of a 9 in. wall, and single blocks within the thickness of a 4½ in. wall. The former permit of the installation of fires back to back in adjoining rooms.

Flues constructed of brickwork or concrete blocks within the thickness of walls must be properly bonded in.

18. MATERIAL USED FOR FLUE PIPE.

The materials to be used will generally be determined by the temperature of the diluted products of combustion which they are to accommodate. The materials are to be mechanically firm, resistant to normal internal and external corrosion, durable and incombustible.

The flueway connected to a gas fire shall be surrounded with incombustible material not less than 1 inch in thickness exclusive of any plaster, and such material shall satisfy the tests prescribed in British Standard Specification No. 476-1932.

Where there is an air space between the flue and the surrounding incombustible material, the thickness of the material may be reduced.

19. FLUE JOINTING.

For spigot and socket type of connections, the socket shall be arranged facing upwards for all indoor work. Flue pipe fitted to the outside of walls shall be securely attached to the walls, and jointed so as to be proof against rain.

20. INSULATION FROM BUILDING MATERIAL.

Owing to the low temperature of flue pipes used with gas water heaters, special insulation between the flue pipe and surrounding building material is unnecessary. An air space of not more than 1 in., to prevent actual contact of the pipe and combustible material, is adequate. The annular clearance may be closed with a suitable loosely-fitting flange of incombustible material.

21. TERMINALS.

Flue terminals used on the outside of a building shall be so designed as to prevent ingress of snow, rain or foreign matter or of birds or small animals, and shall comply with the recommendations contained in British Standard Specification No. ——.*

The effective outlet area of certain terminals may legitimately be less than that of the flue pipe to which they are attached, and some compensating advantage may be obtained from special constructions involving local constrictions in that they may diminish the incidence of downdraught, although no terminal can be guaranteed at all times and in all conditions to prevent downdraught.

22. POSITION OF TERMINAL.

The most consistent performance of the flue is usually achieved when the terminal is in an exposed position above the eaves of the house or preferably above the ridge of the house. Where the flue has to be terminated on the face of a wall, the design of the terminal shall be such as to take advantage of the air movement to achieve updraught in the flue.

Unfavourable positions which must be avoided are immediately beneath the eaves or in a re-entrant position on the face of the building such that general wind effects are likely to create a local zone of high pressure which, in turn, is likely to lead to downdraught in the flue.

SECTION VIII.

MISCELLANEOUS.

23. AVOIDANCE OF DAMAGE BY ELECTRICITY.

Wherever possible, pipes shall be placed at a distance of not less than 6 in. from electric cables or conduits carrying electric cables. Where this is not possible, the pipes shall be protected by adequate insulation or other means from coming into contact under any condition of service with such cables and conduits.

24. PROTECTION OF FLOORS.

Under every open base domestic copper, oven or stove heated by gas and having a flame exposed to the floor and within 4 in. of it, a slab of material 2 inches in thickness and conforming to British Standard Specification No. 476-1932, or other equally satisfactory heat insulation, shall be provided so as to extend for a distance of not less than 2 in. on all sides around the base. When the floor itself is of concrete, tiles or other incombustible material, the foregoing requirements may be dispensed with.

25. HEARTHS.

There shall be laid level with the floor or on the floor before the fireplace opening of every flue to which a gas fire is connected, a hearth or slab of incombustible material not less than 2 inches in thickness and conforming to British Standard Specification No. 476-1932, or some other equally satisfactory insulation. This hearth shall extend not less than 6 in. beyond the fireplace opening on either side and shall project at least 12 in. and preferably 18 in. from such opening. Excluded from these Regulations are gas fires the flames of which are 9 in. or more from the floor level, and mantel register fires with raised metal hearths of which the overall height is not less than 1½ in. and forward projection not less than 10 in.

26. WOODEN PLUGS.

Wooden plugs shall not be used in fitting panel fires.

SCHEDULE I.

SERVICE PIPES.

	Material.	Specification No.	Type.
Service Pipe . .	Mild Steel	B.S.S. No. —*	Steam Weight
	Wrought Iron	B.S.S. No. —*	Steam Weight
	Cast Iron	B.S.S. No. 78–1917	—
Service Tubulars.	Mild Steel	B.S.S. No. —*	Steam Weight
	Wrought Iron	B.S.S. No. —*	Steam Weight
	Cast Iron	B.S.S. No. 78–1917	—
Service Fittings .	Malleable	B.S.S. No. 143–1922	Banded
	Cast Iron	B.S.S. No. 154–1922	Banded
	Mild Steel	B.S.S. No. —*	Steam Weight
	Wrought Iron	B.S.S. No. —*	Steam Weight
	Cast Iron	B.S.S. No. 78–1917	—

* In preparation.

SCHEDULE III.

INTERNAL OR CARCASS PIPES.

	Material.	Specification No.	Type.
Iron Pipes . .	Mild Steel	B.S.S. No. —*	Gas or Steam Weight
	Wrought Iron	B.S.S. No. —*	
Iron Tubulars .	Mild Steel	B.S.S. No. —*	Gas or Steam Weight
	Wrought Iron	B.S.S. No. —*	
Iron Fittings . .	Malleable	B.S.S. No. 154–1922	Plain or Banded
	Cast Iron	B.S.S. No. 143–1922	
	Mild Steel	B.S.S. No. —*	Gas or Steam Weight
	Wrought Iron	B.S.S. No. —*	
Copper Tubing .	—	B.S.S. No. 659–1936	—
Copper Tubulars.	—	B.S.S. No. —*	—
Copper Fittings .	—	B.S.S. No. —*	To be of a type approved by the Undertaking
Pipe Hangers and Fixings	Malleable Cast Iron	B.S.S. No. —*	—
Main Cocks . .	Good quality Brass	—	To be of a type approved by the Undertaking
Union Cocks . .	Good quality Brass	—	
Lead Pipe . .	—	B.S.S. No. 602–1935	Gas Weight
Composition Pipe	—	B.S.S. No. —*	—
Meter Unions .	—	B.S.S. No. 746–1937	—
Brass Tubing .	—	—	See Schedule IV.
Brass Fittings .	—	—	To be of a type approved by the Undertaking

* In preparation.

* In preparation.

Instantaneous supply of HOT WATER

TO KITCHEN SINK, WASH BASIN, ETC.

The "Prestot" is supplied in two forms. The Standard form has hot and cold water taps neatly finished with bakelite covers, coloured red and black respectively. By the use of these, water at any temperature from cold to very hot can be obtained at will. Other features include the bye-pass safety device; automatic gas and water valve; rust-proofed cast iron burner with independently fixed burner jets; combustion chamber of the non-condensing type; flexible fixing.

The Alternative form has a single hot water tap, and is normally for use where more than one water tap is already available at the sink. It is further equipped with a swivelling chromium-plated outlet spout attachment.

The water can be used for culinary purposes, whether hot or cold.

The finishes are white, green or blue porcelain enamel. The fittings are chromium-plated.

Full particulars and descriptive literature obtainable on request.

☆ PRESTOT ☆

INSTANTANEOUS WATER HEATER

R. & A. MAIN LIMITED, LONDON AND FALKIRK

London Office and Showrooms: 48, Grosvenor Gardens, S.W.1. Glasgow Office and Showrooms: 82, Gordon Street.

SCHEDULE II.

(*a*) TABLE OF DISCHARGE FOR STRAIGHT HORIZONTAL PIPES WITH 3/10 IN. DIFFERENTIAL PRESSURE FOR GAS OF DENSITY 0·50 RELATIVE TO AIR (CU.FT. PER HOUR).

NOTE.—The figures given in this Table are to be used as a basis in deciding the size of pipe to supply gas between the meter and various points of consumption on the premises. They refer to pipes of steam weight (British Standard Specification) and are valid for gas of density from 0·4 to 0·5. When pipes of gas weight are used, the pipe bore being larger the discharge is increased, and the values given are then applicable to gas of density greater than 0·5. It is to be noted that the tabulated figures refer to horizontal pipes. The effects of rising or falling pipes on the pressure head have not been taken into account.

Size of Pipe in Inches (Nominal Bore).	Relative Carrying Capacity.	Length of Pipe in Feet															
		10	20	30	40	50	60	70	80	90	100	125	150	175	200	250	300
⅛	1	38															
¼	7	25	12														
⅜	15	55	39	32													
½	29	108	76	62	54												
¾	60	225	160	130	110	100	92	83									
1	127	470	330	270	235	210	190	175	165	155	145						
1¼	250	930	655	535	465	415	380	350	330	310	295	260	240	220	205	185	170
1½	352	1,300	920	750	650	580	530	490	460	435	415	370	340	310	290	260	240
2	710	2,640	1,865	1,525	1,320	1,180	1,075	995	930	880	835	745	680	630	590	530	480
2½	1,360	5,055	3,575	2,920	2,525	2,260	2,065	1,910	1,785	1,685	1,600	1,430	1,305	1,210	1,130	1,010	925
3	2,210	8,240	5,830	4,760	4,120	3,685	3,365	3,115	2,915	2,750	2,605	2,330	2,130	1,970	1,840	1,650	1,505

(*b*) TABLE GIVING ADDITIONS TO BE MADE TO OVERALL LENGTH OF A PIPE (IN FEET) FOR INCREASED RESISTANCE INTRODUCED BY FITTINGS.

Size of Pipe in Inches.	Elbows.	Tees.	90° Bends.
⅛ to 1	2	2	1
1¼ to 1½	3	3	1
2	5	5	2
3	8	8	3

SCHEDULE IV.

SPECIFICATION FOR BRASS TUBING FOR THE GAS INDUSTRY.

1. *Chemical Composition.*

The chemical composition of the tubes shall be:

Copper	Not less than 70 per cent.
Tin (if present)	Not more than 1·25 per cent.
Total impurities	Not more than 0·75 per cent.
Zinc	The remainder.

2. *Manufacture.*

(*a*) The tubes shall be solid drawn from virgin metal and free from defects; the process of "hollow-sinking" shall not be used.

(*b*) The tubes shall not be re-drawn from tubes that have been used previously.

(*c*) The tubes shall be annealed at such a temperature and for such time as will ensure that a sample of the tube shall stand the following test:

A sample of the tube shall be immersed in a 1 per cent. solution of mercurous nitrate for 15 min. and allowed to stand for 24 hours, and upon inspection the sample shall be free from cracks.

The solution referred to shall be prepared as follows: to 983 millilitres of water add 7 millilitres of nitric acid (specific gravity 1·42) and 10 grammes of mercurous nitrate.

THE APPLICATION OF RAWLPLUGS TO Modern Fixing Practice

Mr. R. N. LeFevre, M.Inst.Gas E., A.I.Mech.E., Officer in Charge of Training, Gas Light and Coke Company, gives some useful hints on applications of Rawlplugs to modern fitting work in the Gas Industry.

The word "gas" is intimately associated with "pipes." Pipes are not things of beauty and should, wherever possible, be concealed. It frequently happens, however, that their concealment is impossible or impracticable, in which event there is no reason why they should be obtrusive.

The finished appearance of visible pipe work depends to a great extent on the method of attachment to the wall and the location of the clips. If suitable clips are used, and are properly secured to the wall by means of the appropriate size of Rawlplug and screw, their number can be reduced to the minimum consistent with rigidity of the pipe. On high-class work such as is to be found in the majority of modern premises, too much attention cannot be given to the choice of a suitable type of pipe clip. Examples of two good methods of attaching pipes to walls are afforded by the strapped fitting and the strapped clip.

Strapped Fittings.

The use of strapped fittings dispenses entirely with the use of separate pipe clips. The arrangement consists essentially of using pipe fittings—couplers or sockets, elbows, tees, and the like—which have ears or straps attached as an integral part of the malleable casting. Such fittings are made in the complete range of British Standard malleable cast iron pipe fittings and representative examples are shown in fig. 1 where A represents a strapped socket; B, a strapped tee; and C, a strapped elbow. A typical instance of the use of the latter is for connecting the gas and water supplies to water heaters. In fig. 1, D, the supply pipe, G, is taken up the wall to a convenient level and the horizontal branch, H, is connected to it by means of the strapped elbow E; the lugs, F, being secured to the wall by Rawlplugs and screws. Such a method provides a neat and firm connection, as no amount of careless handling of the appliance will disturb the pipe connections to it.

High Grade Strapped Clips.

These clips are normally supplied chromium-plated, but may be obtained plain if so desired. They are available in a range to suit the smaller standard sizes of mild steel, wrought iron, and British Standard Light Gauge copper tubing. They are made also in two distinct types, one being for pipes to be secured on the flat surfaces of walls,

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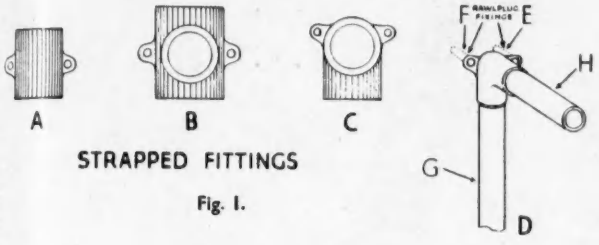
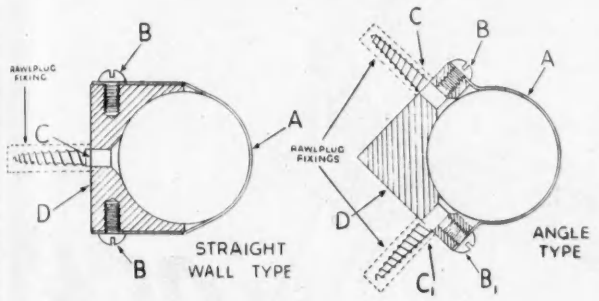
the other for keeping pipes neatly in the angle between two walls or between the wall and the ceiling. The advantages of these types of clip are the secure and concealed fixing and the extraordinarily neat appearance of the finished work, due to the fact that nothing protrudes from the line of pipe. The method of fixing will be self-explanatory from the diagrams.



STRAPPED FITTINGS

Fig. 1.



DE LUXE PATTERN PIPE CLIPS

Fig. 2.

Fig. 2, *a*, shows the straight type; the body, D, is secured to the wall by a Rawlplug and screw. If several clips are to be fitted along a wall, they can be lined up, levelled, equidistantly spaced and fitted; all before the pipe is offered up. The pipe is held to the body of the clip by the strap, A, which in turn is secured by the two small roundhead BA screws, B, B_1. The angle type is held by two Rawlplugs and screws as shown at C and C_1 in fig. 2, *b*.

Fitting Large Storage Water Heaters.

The larger types of gas storage water heater such as the "Equator" and "Sunhot" must, of necessity, be fitted to stand on the floor. The smaller sizes of these heaters are, however, in popular demand, while it often happens that they are required in small kitchens and similar locations where floor space is at a premium. To meet such circumstances the 13 gallon "Equator" water heater and the 12 and 20 gallon "Sunhot" water heaters may be obtained with a set of special brackets to enable them to be mounted on the wall. It must be realized, however, that these heaters, when filled with water, have considerable weight. The 12 and 20 gallon "Sunhots," when filled with water, weigh 2½ cwt. and 3½ cwt. respectively, while the "Equator" weighs 3 cwt. They should therefore be fitted in this manner only when it is certain that the wall is sound and capable of supporting the weight with safety. It is not proposed to extend this method of fitting to the larger sizes of water heater, as the weight would obviously be too great for the walls which are to be found in the majority of modern houses.

By means of co-operation with the manufacturers it has been possible to adopt almost the same method of fixing for both the "Equator" and the "Sunhot" water heaters. The equipment required for fitting both heaters is illustrated in fig. 3. In the case of the "Equator" the heater is supported by a cast-iron wall bracket N at the base and a retaining strap G is placed round the heater just below the joint on the top section of the outer casing. With the "Sunhot" the same cast-iron bracket N is used to take the weight of the heater at the base, but the top supporting strap G is of a slightly different shape and goes round the draw-off pipe instead of round the body of the heater.

The complete set of fittings required for use with the "Sunhot" water heater is as follows:

(*a*) Top strap A having three screw holes S. This strap carries the retaining strap B, which is secured to it by the nuts C. The bolt D is passed behind the flow pipe.

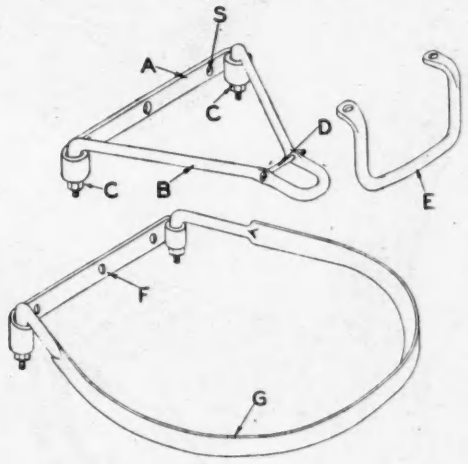
(*b*) A pad H. This acts as a distance piece and carries the two dowel pins T which screw into the base of the cylinder. It also acts as a template when drilling the two holes for the dowel pins. The dowel pins fit into the holes R in

(*c*) The bottom bracket N. Three holes are provided for attaching the bottom bracket to the wall.

In the case of the "Equator" water heater the following equipment is supplied:

(*a*) A top wall strap F which is identical with the strap A used for the "Sunhot." This carries the retaining strap G, which is passed round the heater just below the joint of the top casing.

(*b*) A support E. This is fitted inside the heater to prevent the case being distorted by the tension of the strap G. It is held by two of the bolts which secure the dome to the inner cylinder. Two nuts are removed, the support is clipped over the bolts, the nuts are replaced and tightened up.



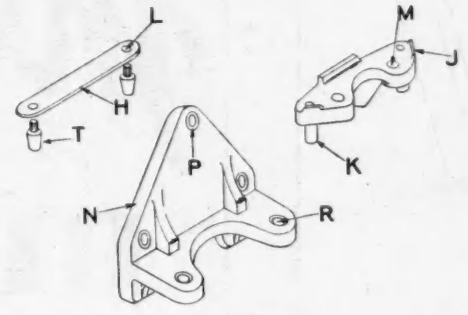


Fig. 3.

(*c*) The cast-iron pad M. This is screwed to the base of the heater in a position normally occupied by one of the legs, and carries two dowel pins K, which are identical with the dowel pins T used for the "Sunhot."

(*d*) Cast-iron bottom plate N which is the same as that used for the "Sunhot." The dowel pins K fit into the holes R.

(To be continued.)

Trade Notes

"Calor Gas" Progress.

In recent months the Calor Gas (Distributing) Company, Ltd., Belgrave House, Belgrave Street, W.C. 1, have made very considerable advances, and now it is interesting to note that over 2,000 galls. of petrol are used each week in the "Calor Gas" mobile showrooms visiting rural homes and buildings. The firm now gives full-time employment to 300 persons. There are over 25,000 users of the service, which is fulfilling their cooking, heating, lighting, and refrigeration requirements. There are over 1,000 installations in yachts and caravans, pleasure steamers, Government cutters, army camps, &c. Street, church, hotel, and buoy lighting are claimed outstanding "Calor Gas" features. To meet this rapidly expanding business there have already been established over 500 service and supply depôts.

The Calor Gas (Distributing) Company have recently issued a booklet with the title "You Can Have Gas" printed on the cover beneath a picture of a lonely country house. In this publication are given many examples of the various uses to which "Calor Gas" can be put, with details of the service.

The Masterpiece of SIMMANCE PATENT DEAD-BEAT INDICATORS

When the idea of the "dead-beat" mechanism was first evolved, it was considered that half-a-dozen ranges would meet all requirements. In those days little was it realised what a vast structure would develop. Now a hundred different ranges hardly suffice to meet ordinary requirements; but still, for all normal gasworks ranges, the fundamental design of mechanism—the MASTERPIECE of all Dead-Beat Recorders and Indicators—is retained.

Alexander Wright & Co. Ltd.
WESTMINSTER·S·W·I

Gas Markets and Manufactures

Stock Market Report

(For Stock and Share Lists, see later pages)

The upward movement in prices which confidence in home affairs fully justifies is once again being held in check by events abroad. The crisis in the Far East had a depressing effect on most markets last week, and the volume of business was reduced to small dimensions. While the present uncertainty lasts investors will doubtless curtail their commitments, so that the prospects for the new account opening this week do not appear particularly bright. Japanese and Chinese securities had a disastrous time, investors being anxious to dispose of their holdings. One satisfactory feature was the strength of gilt-edged stocks, which closed firm and steady. Home rails were dull, the latest traffic returns being insufficiently interesting to attract buyers. Industrial and mining shares with few exceptions remained weak, though inquiry continued for iron, coal, and steel shares. In the Kaffir market prices showed a general downward trend.

In common with most sections the volume of business in the Gas Market continued on the light side and there were no special features. A contrast, however, is that prices have not suffered as they have in many other departments, and last week were inclined to harden. Several stocks marked down the previous week recovered the loss—viz., Oriental, which regained the drop of 4 points, and South Suburban and Wandsworth 5% debenture stocks, both of which recovered a fall of 2 points. Apart from these it will be seen in the Official List that a number of other improvements occurred, including a rise of 3 in South Metropolitan 5% debenture. At the Provincial Exchanges, the only alteration was in Newcastle units which partially regained the *ex* div. drop of a fortnight ago, while in the Supplementary List nominal quotations again remained unchanged.

It is interesting to note that Associated Gas and Water Undertakings, Ltd., whose activities have been confined in the past mainly to the counties of Kent, Surrey, and Sussex, has made an offer to the stockholders of the Ilfracombe Gas Company to acquire the whole of the issued consolidated ordinary stock and 5% preference stock, the terms of which have been conveyed in a circular to the stockholders. The ordinary shares of the Associated Undertakings are at present obtainable at round about par to give a yield of 5%, this being the rate of dividend paid since the Company's first accounting period in 1935.

Current Sales of Gas Products

The London Market for Tar Products

LONDON, *Aug.* 23.

There is little change to record in the prices of tar products in the London market, which are as follows:

Pitch, 38s. per ton f.o.b.
Creosote, 6d. to 6¼d.
Refined tar, 3⅜d..
Pure toluole, 2s. 6d.; pure benzole, 1s. 9d.; 95/160 solvent naphtha, 1s. 8d.; and 90/160 pyridine, about 9s.—all per gallon naked at makers' works.

Tar Products in the Provinces.

Aug. 23.

The average prices of gas-works products during the week were: Gas-works tar, 23s. 6d. to 28s. 6d. Pitch—East Coast, 36s. to 37s. 6d. f.o.b. West Coast—Manchester, Liverpool, Clyde, 36s. to 37s. 6d.* Toluole, naked, North, 2s. to 2s. 1d. Coal tar, crude naphtha. in bulk, North, 8½d. to 9d. Solvent naphtha, naked, North, 1s. 6¼d. to 1s. 6½d. Heavy naphtha, North, 1s. 3d. to 1s. 3½d. Creosote, *ex* works, in bulk, North, liquid and salty, 5d. to 5½d.; low gravity, 4⅝d. to 4½d. Heavy oils, in bulk, North, 5d. to 5¼d. Carbolic acid 60's, 4s. 1½d. to 4s. 3d. Naphthalene, £18 to £20. Salts, 90s. to 95s., bags included. Anthracene "A" quality. 4½d. to 4⅝d. per minimum 40% purely nominal; "B" quality, unsalable.

* All prices for pitch are now quoted on the basis of f.o.b. In order to arrive at the f.a.s. value at any port it will be necessary to deduct the loading costs and the tolls whatever they may be

Tar Products in Scotland.

GLASGOW, *Aug.* 21.

If anything there has been more buying interest apparent during the week. Quotations for all products remain remarkably steady.

Crude gas-works tar.—The actual value is 37s. to 38s. per ton *ex* works in bulk.

Pitch is not particularly brisk with values unchanged at about 30s. to 32s. 6d. per ton f.o.b. Glasgow for export, and 30s. per ton *ex* works in bulk for home trade.

Refined tar is still leaving the works in large quantities, but new business is scarce. Quotations are held at 3d. to 3⅛d. per gallon free on rails for export, and 3⅛d. to 3⅜d. per gallon *ex* works in buyers' packages for home trade.

Creosote oil.—Demand is about equal to supply and makers' prices are not lower than the following: Specification oil, 5⅛d. to 5¾d. per gallon; low gravity, 6d. to 6¼d. per gallon; neutral oil, 5¼d. to 5½d. per gallon; all *ex* works in bulk.

Cresylic acid.—New business is still rather scarce, but values are unchanged as under: Pale, 97/99%, 4s. 3d. to 4s. 5d. per gallon; dark, 97/99%, 4s. to 4s. 2d. per gallon; and pale, 99/100%, 4s. 8d. to 4s. 11d. per gallon; all *ex* works in buyers' packages.

Crude naphtha.—Available supplies command round 6d. to 6⅛d. per gallon *ex* works in bulk, according to quality and district.

Solvent naphtha.—90/160 grade is quoted at 1s. 5d. to 1s. 6d. per gallon; and 90/190 heavy naphtha, at 1s. to 1s. 1d. per gallon.

Motor benzole is changing hands at round 1s. 4½d. to 1s. 5d. per gallon.

Pyridine.—Prices are nominal at 7s. to 8s. per gallon for 90/160 grade, and 8s. to 9s. per gallon for 90/140 grade.

Benzole Prices.

These are considered to be the market prices for benzole at the present time:

	s. d.		s. d.	
Crude benzole . . .	0 9½	to	0 10	per gallon at works
Motor ,, . . .	1 3	,,	1 3½	,, ,, ,,
90% ,, . . .	1 4	,,	1 4½	,, ,, ,,
Pure ,, . . .	1 8	,,	1 8½	,, ,, ,,

Contracts Advertised To-Day

Dehydration Plant.
Blackpool Gas Department. [p. 486.]

Gasholder.
Dewsbury Gas Department. [p. 486.]

Locomotive and Shed.
Blackpool Gas Department. [p. 486.]

Weighbridges.
Blackpool Gas Department. [p. 486.]

Wrought Iron Tubes and Fittings.
Leeds Gas Department. [p. 486.]

Further Gas Undertakings' Results

Colne.

The annual report of the Engineer and Manager of the Colne Gas Department, Mr. A. H. Nicolson, for the year ended March 31, 1937, states that the income amounted to £50,031 and expenditure to £42,162, leaving a gross profit of £6,869, which, less interest and sinking fund, &c., left a net profit of £332. The gas made totalled 232,978,000 cu.ft., and the gas sent out amounted to 232,985,000 cu.ft. The yield of gas per ton of coal was 21,085 cu.ft. The unaccounted-for gas amounted to 9,702,000 cu.ft., or 4·32%. While there was a decrease in the amount of gas sent out of 2,674,000 cu.ft., there was an increase of 224,000 cu.ft. in the amount of gas sold. The number of gas lighted lamps in the Borough is now 1,258, 19 new lamps having been fixed during the year. The quantity of gas used for public lighting amounted to 27,090,700 cu.ft.

Shrewsbury.

The Directors of the Shrewsbury Gas Light Company report that for the year ended June 30, 1937, the gross profit on the revenue account amounts to £9,405. After allowing for the interim dividend of 2½% (less tax) paid in March last, and the interest on mortgages for the year, the balance of net profit available amounts to £12,328. The Directors recommend that a final dividend of 4¼% (less tax), making 6¾% (less tax) for the year, be declared, payable on and after Sept. 9, 1937. The reserve fund now stands at £13,591. The new coke-screening plant and storage bunkers were completed last autumn, and have been in satisfactory operation, also the new plant for the extraction of crude benzole. There has been an increase of over 2¾ million cu.ft. in the volume of gas sold during the past year. The number of cookers on hire at June 30 was 5,219, together with 1,952 fires and radiators. There were also 3,277 ordinary meters and 7,818 prepayment meters in use. In addition, the number of gas cookers, fires, water heaters, &c., sold during the year amounted to 1,237.

GLOVER WEST

NEW VERTICAL RETORT PLANTS NOW IN REGULAR SERVICE

SVENDBORG

This installation, built for the Municipality of Svendborg, Denmark, is an interesting example of the modern Glover-West vertical retort plant designed for the smaller works. It is an eight-retort unit with fuel-gas producers equipped for breeze-burning, waste-heat recovery plant and electric lift. Coaling is by means of an automatic skip-hoist.

400 plants in 24 countries

THE SOCIETY OF BRITISH GAS INDUSTRIES · 1905 ·

WEST'S GAS IMPROVEMENT CO., LTD.

MANCHESTER: ALBION IRONWORKS, MILES PLATTING ■ LONDON: COLUMBIA HOUSE, ALDWYCH, W.C. 2

STOCK AND SHARE LIST

Official Quotations on the London Stock Exchange

Issue. £	Stock or Share	When ex-Dividend.	Dividends. Prev. Hf. Yr. % p.a.	Dividends. Last Hf. Yr. % p.a.	NAME.	Quotations Aug. 20.	Rise or Fall on Week.	Transactions. Lowest and Highest Prices During the Week.
1,767,439	Stk.	Mar. 15	8	8	Alliance & Dublin Ord. ...	170—175	...	172½—173 7/16
374,000	,,	June 21	4	4	Do. 4 p.c. Deb. ...	95—100	...	...
558,890	,,	Aug. 9	7	7	Barnet Ord. 7 p.c.	158—163*	...	...
300,000	1	Apl. 5	1/4½	1/9½	Bombay, Ltd.	26/6—28/6	—1/-	27/3
179,915	Stk.	Aug. 9	9½	9½	Bournemouth sliding scale ...	192—202*	...	200
590,407	,,	,,	7	7	Do. 7 p.c. max. ...	158—163*	...	...
493,960	,,	,,	6	6	Do. 6 p.c. Pref. ...	130—135*	...	...
50,000	,,	June 21	3	3	Do. 3 p.c. Deb. ...	79—84	...	...
262,025	,,	,,	4	4	Do. 4 p.c. Deb. ...	98—103	...	...
335,000	,,	,,	5	5	Do. 5 p.c. Deb. ...	116—121	...	...
357,900	,,	Aug. 9	7½	7½	Brighton, &c., 6 p.c. Con. ...	152—157*	...	...
649,955	,,	,,	6½	6½	Do. 5 p.c. Con. ...	135—140*	...	136 3/16—138½
205,500	,,	,,	6	6	Do. 6 p.c. 'B' Pref.	127—133*	...	...
855,000	,,	Mar. 1	7	8	British Ord.	148—153	...	149
100,000	,,	June 21	7	7	Do. 7 p.c. Pref.	140—145	...	...
350,000	,,	,,	5½	5½	Do. 5½ p.c. 'B' Cum. Pref.	108—113	...	...
120,000	,,	June 7	4	4	Do. 4 p.c. Red. Deb. ...	95—100	...	...
450,000	,,	,,	5	5	Do. 5 p.c. Red. Deb. ...	102—107	...	...
450,000	,,	,,	3½	3½	Do. 3½ p.c. Red. Deb. ...	95—100	...	...
100,000	10	22 May '33	6	4	Cape Town, Ltd.	1¾—2¾	...	...
100,000	10	6 Nov.'33	4½	4½	Do. 4½ p.c. Pref. ...	1¾—3¾	...	...
150,000	Stk.	June 21	4½	4½	Do. 4½ p.c. Deb. ...	79—84	...	...
626,860	,,	July 19	6	6	Cardiff Con. Ord.	125—130	...	...
237,860	,,	June 7	5	5	Do. 5 p.c. Red. Deb.	107—112	...	...
98,936	1	Apl. 5	2/-	2/-	Colombo Ord.	1⅞—1⅞	...	...
24,510	1	,,	1/4½	1/4½	Do. 7 p.c. Pref. ...	23/—25/-	...	...
739,453	1	Mar. 15	-/11·48	-/11·48	Colonial Gas Assn. Ltd. Ord.	18/—20/-	...	18/3—18/6
296,144	1	,,	1/3·30	1/3·30	Do. 8 p.c. Pref.	22/—24/-	...	23/9—24/-
1,775,005	Stk.	Aug. 9	5	5	Commercial Ord.	90—95*	...	90½—91
620,000	,,	June 7	3	3	Do. 3 p.c. Deb. ...	74—79	...	76
286,344	,,	Feb. 15	5	5	Do. 5 p.c. Deb. ...	115—120	...	...
807,560	,,	Aug. 9	7	7	Croydon sliding scale ...	140—145*	...	143—143½
644,590	,,	,,	5	5	Do. max. div.	108—113*	...	...
620,385	,,	June 21	5	5	Do. 5 p.c. Deb.... ...	113—118	...	117½
239,000	,,	Aug. 9	5	5	East Hull Ord. 5 p.c.... ...	98—103*	...	...
185,355	,,	Aug. 9	6	6	East Surrey Ord. 5 p.c. ...	120—125*	...	...
176,211	'	June 7	5	5	Do. 5 p.c. Deb. ...	113—118	...	117
250,000	1	July 5	4	7	Gas Consolidation Ord. ...	20/—22/-	...	20/1½
250,000	1	May 24	4	4	Do. 4 p.c. Red Cum. Pref.	19/—21/-	...	...
19,255,284	Stk.	Aug. 9	5½	5½	Gas Light & Coke 4 p.c. Ord.	24/3—25/3o*	...	24/3—24/10½
2,600,000	,,	,,	3½	3½	Do. 3½ p.c. max.	82—85*	...	83—84
4,477,106	,,	,,	4	4	Do. 4 p.c. Con. Pref. ...	99—102*	...	99½—100½
2,993,000	,,	July 5	...	3½	Do. 3½ p.c. Red. Pref.	100—103	...	102½—102½
8,602,497	,,	May 24	3	3	Do. 3 p.c. Con. Deb. ...	79—82	...	78½—80
3,642,770	,,	,,	5	5	Do. 5 p.c. Red. Deb. ...	111—114	...	...
3,500,000	,,	,,	4½	4½	Do. 4½ p.c. Red. Deb....	110—113	...	112
700,000	,,	Mar. 1	§25/5	3½	Do. 3½ p.c. Red. Deb....	96—101	...	97—99
270,466	,,	Feb. 15	6	6	Harrogate New Cons. ...	122—127	...	...
213,200	,,	Aug. 9	6	6	Hornsey Con. 3½ p.c. ...	118—123*	...	...
5,600,000	,,	May 24	8	12	Imperial Continental Cap. ...	146—151	...	146—148½
223,130	,,	July 19	3½	3½	Do. 3½ p.c. Red. Deb. ...	89—94	...	...
285,242	,,	Aug. 9	8½	8½	Lea Bridge 5 p.c. Ord. ...	158—163*	...	...
75,000	,,	May 24	†10	†10	Malta & Mediterranean ...	150—160	...	...
392,000	—	Apl. 1	5½	5½	Metropolitan (of Melbourne) 5½ p.c. Red. Deb.	98—103	...	...
231,978	Stk.	Feb. 15	5	5	M.S. Utility 'C' Cons. ...	102—107	...	...
968,657	,,	,,	4	4	Do. 4 p.c. Cons. Pref.	95—100	...	96
360,075	,,	June 21	4	4	Do. 4 p.c. Deb. ...	97—102	...	...
148,955	,,	,,	5		Do. 5 p.c. Deb. ...	115—120	...	...
125,000	—	July 1	3½	3½	Do. 3½ p.c. Rd.Rg.Bds.	96—99	...	...
675,000	Stk.	May 3	†6	†9	Montevideo, Ltd.	89—94	...	...
250,000	,,	Aug. 9	7½	7½	North Middlesex 6 p.c. Con.	157—167*	...	...
396,160	,,	Aug. 9	5	5	Northampton 5 p.c. max. ...	110—115*	...	...
300,000	,,	Apl. 19	†9	†7	Oriental, Ltd....	162—167	+4	166
468,537	,,	June 7	8	8	Plymouth & Stonehouse 5 p.c.	160—170	...	...
621,667	,,	Aug. 9	8½	8½	Portsmouth & Gosport Cons.	164—169*	...	165½
241,446	,,	,,	5	5	Do. 5 p.c. max. ...	104—109*	...	...
73,350	,,	,,	5	5	Do. 5 p.c. Pref. ...	110—115*	...	115
441,275	1	May 3	1/-	1/1½	Severn Val. Gas Cor. Ld. Ord.	21/—23/-	...	22/4½
460,810	1	Mar. 15	-/10½	-/10½	,, ,, 4½ p.c. Cum. Pref.	20/—22/-	...	...
133,201	Stk.	Feb. 15	5	8½	Shrewsbury 5 p.c. Ord. ...	140—145	...	...
1,371,752	1	May 3	1/2⅝	1/2⅝	South East'n Gas. Cn.Ld. Ord.	24/—26/-	...	24 9—25/3
871,636	1	Mar. 1	-/10½	-/10½	Do. 4½ p.c. Red. Cum. Pref.	20/—22/-	...	...
498,818	1	,,	4	4	Do. 4 p.c. Cum. Pref. ...	18/6—20/6	...	19/3—19/6
450,000	Stk.	Aug 9	4	4	Do. 4 p.c. Deb.	99—102*	...	...
150,000	,,	,,	3½	3½	Do. 3½ p.c. Red. Deb. ...	98—100*	...	...
6,709,895	,,	Aug. 9	6	5	South Met. Ord.	105—108*	...	105½—106½
1,135,812	,,	,,	6	6	Do. 6 p.c. Irred. Pf. ...	130—135*	...	...
850,000	,,	,,	4	4	Do. 4 p.c. Irred. Pf. ...	98—101*	+1	101
1,895,445	,,	June 21	3	3	Do. 3 p.c. Deb. ...	75—80	...	77
1,000,000	,,	July 5	5	5	Do. 5 p.c. Red. Deb....	110—113	+3	...
1,543,795	,,	Aug. 9	6	6	South Suburban Ord. 5 p.c....	120—125*	..	123—124
512,825	,,	,,	5	5	Do. 5 p.c. Pref....	110—115*	...	...
500,000	,,	,,	4	4	Do. 4 p.c. Pref....	95—100*	...	97
250,000	,,	,,	...	§18/9	Do. 3½ p.c. Red. Pref.	98—101*	...	...
888,587	,,	June 7	5	5	Do. 5 p.c. Deb....	115—120	+2	115½
250,000	,,	,,	4	4	Do. 4 p.c. Deb....	97—102	...	...
200,000	,,	...	...	...	Do. 3½ p.c. Red. Deb.	95—100	...	...
427,859	1	May 3	9⅜	1/2⅜	S. Western Gas & Water Ord.	19/—21/-	...	19/-
160,523	1	Apl. 19	-/10½	-/10½	Do. 4½ p.c. Red. Cum. Pf.	20/—22/-	...	...
110,000	Stk.	June 21	4	4	Do. 4 p.c. Red. Deb. ...	97—102	...	...
750,541	,,	Aug. 9	5⅜	5	Southampton Ord. 5 p.c. ...	111—116*	...	115½
148,836	,,	June 7	4	4	Do. 4 p.c. Deb.	97—102	...	...
350,000	,,	Feb. 15	5½	5½	Swansea 5½ p.c. Red. Pref. ...	112—117	+2	...
94,000	,,	June 7	3½	3½	Do. 3½ p.c. Red. Deb. ...	95—100	...	98
1,076,490	,,	Aug. 9	6⅜	6⅜	Tottenham and District Ord.	135—140*	...	137
409,835	,,	,,	5⅜	5⅜	Do. 5½ p.c. Pref....	121—126*	...	...
62,235	,,	,,	5	5	Do. 5 p.c. Pref. ...	109—114*	...	112½
371,850	,,	June 7	4	4	Do. 4 p.c. Deb. ...	97—102	...	...
750,000	1	Apl. 5	4	6	U. Kingdom Gas Cor. Ord.	20/—22/-	...	...
936,338	1	May 3	4½	4½	Do. 4½ p.c. 1st Cum. Pref.	20/—22/-	...	21/—21/3
740,933	1	June 7	4½	4½	Do. 4½ p.c.2nd Non-Cum.Pf.	17/—19/-	...	...
700,000	Stk.	Mar. 15	3½	3½	Do. 3½ p.c. Red. Deb. ...	96—99	...	97½
373,939	,,	Aug. 9	7	7	Uxbridge, &c., 5 p.c. ...	147—152*	...	...
133,010	,,	,,	5	5	Do. 5 p.c. Pref. ...	109—114*	...	...
1,371,138	,,	Aug. 9	7	7	Wandsworth Consolidated ...	141—146*	...	141—142½
1,620,615	,,	,,	5	5	Do. 5 p.c. Pref ...	117—122*	—1	...
500,000	,,	,,	4	4	Do. 4 p.c. Pref. ...	97—100*	...	...
1,343,964	,,	June 7	5	5	Do. 5 p.c. Deb. ...	115—120	+2	120
383,745	,,	,,	4	4	Do. 4 p.c. Deb. ...	97—102	...	...
558,342	,,	Aug 9	7	7	Watford and St. Albans Ord.	140—145*	...	143—144
200,000	,,	,,	5	5	Do. 5 p.c. Pref. ...	109—114*	...	112
200,000	,,	,,	5⅜	5⅜	Do. 5½ p.c. Pref. ...	121—126*	...	...
200,000	,,	June 7	4	4	Do. 4 p.c. Red. Deb.	97—102	...	...
100,000	,,	,,	3⅜	3⅜	Do. 3½ p.c. Red.Deb.	95—100	...	...

a.—The quotation is per £1 of Stock. * Ex div. † Paid free of income-tax. ‡ For year. § Actual.

Stock and Share List continued overleaf.

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STOCK AND SHARE LIST—Cont.

Stocks Officially Quoted on Provincial Exchanges

Issue. £	Stock or Share	When ex-Dividend.	Dividends. Prev. Hf. Yr. % p.a.	Dividends. Last Hf. Yr. % p.a.	NAME.	Quotations. Aug. 20.	Rise or Fall on Week.	Transactions, Lowest and Highest During the Week.
BRISTOL EXCHANGE.								
347,756	Stk.	July 19	6	5	Bath Cons.	119—121	...	...
1,667,250	,,	July 19	5	5	Bristol, 5 p.c. max.	117—118	...	...
120,420	,,	June 7	4	4	Do. 1st 4 p.c. Deb. ...	100½—102½	...	...
217,870	,,	,,	4	4	Do. 2nd 4 p.c. Deb. ...	100½—102½	...	...
328,790	,,	,,	5	5	Do. 5 p.c. Deb.	120—123	...	...
274,000	,,	July 19	5	5	Newport (Mon.) 5 p.c.max. ...	101—106	...	...
13,200	12	Mar. 15	7	8	Pontyp'l Gas & W. 10 p.c. 'A'	13½—14½	...	...
13,600	10	,,	5	6	Do. 7 p.c. 'B'	12—12½	...	...
40,000	10	,,	5	6	Do. 7 p.c. 'C'	12—12½	...	...
140,778	Stk.	Aug. 9	5	5	Weston-super-Mare Cons. ...	110—112*	...	...
64,338	,,	June 21	4	4	Do. 4 p.c. Deb.	96—98	...	...
33,340	,,	,,	7½	7½	Do. 7½ p.c. Deb.	157—160	...	...
LIVERPOOL EXCHANGE.								
157,150	Stk.	Aug. 9	6½	5	Chester 5 p.c. Ord.	104—109*	...	...
92,500	,,	June 21	4	4	Do. 4 p.c. Pref.	97—101	...	...
36,430	,,	,,	3	3½	Do. 3½ p.c. Deb.... ...	89—92	...	...
41,890	,,	,,	4	4	Do. 4 p.c. Red. Deb. ...	98—102	...	...
2,167,410	,,	Feb. 15	6	6	Liverpool 5 p.c. Ord. ...	126—128	...	...
245,500	,,	June 21	5	5	Do. 5 p.c. Red. Pref. ...	99—104	...	...
306,083	,,	July 1	4	4	Do. 4 p.c. Deb. ...	102—104	...	...
106,280	,,	Aug. 9	10	10	Preston 'A' 10 p.c.	206—216*	...	...
188,219	,,	,,	7	7	Do. 'B' 7 p.c.	147—157*	...	...
NEWCASTLE EXCHANGE.								
122,577	Stk.	Aug. 9	8	8	Blyth 5 p.c. Ord.	165—166*	...	...
732,000	,,	Feb. 15	5	5	Hartlepool G. & W. Co. & New	122—123	...	...
2,061,315	,,	Aug. 9	5¾	5	Newcastle & Gateshead Con.	24/3—24.9*a	+·/1½	...
682,856	,,	,,	4	4	Do. 4 p.c. Pref. ...	98—99*	...	...
776,706	,,	June 21	3½	3½	Do. 3½ p.c. Deb. ...	91—92	...	...
277,285	,	Nov. 2	5	5	Do. 5 p.c. Deb. '43...	108—109	...	...
332,351	,	Feb. 15	6	6	Sunderland 6 p.c. max. ...	139—141	...	...
NOTTINGHAM EXCHANGE.								
542,270	Stk.	Aug. 9	9	6	Derby Con.	150—160*	...	...
55,000	,,	June 7	4	4	Do. 4 p.c. Deb.	100—105	...	...
84,750	,,	Feb. 17	5	12	Long Eaton 'A' Ord. ...	...	...	...
50,000	,,	,,	4	10	Do. 'B' Ord. ...	...	...	...
20,000	10	June 21	5	5	Do. 5 p.c. Pref. ...	10—12	...	...
80,000	Stk.	,,	5	5	Do. 5 p.c. Deb. ...	105—110	...	...
SHEFFIELD EXCHANGE.								
10,000	Stk.	Feb. 15	10	10	Great Grimsby 'A' Ord. ...	210—220	...	...
6,500	,,	,,	10	10	Do. 'B' Ord. ...	210—220	...	...
79,000	,,	,,	10	10	Do. 'C' Ord. ...	205—210	...	...
1,806,339	,,	Feb. 15	6	6½	Sheffield Cons.	146—150	...	...
95,000	,,	July 5	4	4	Do. 4 p.c. Deb.	100—103	...	...
Supplementary List of Stocks and Shares not Officially Quoted								
202,152	Stk.	Mar. 15	25/-b	25/-b	Ascot Ord.	102—107	...	...
128,182	,,	July 5	5	5	Do. 5 p.c. Pref. ...	108—113	...	...
573,156	1	May 24	5	5	Assd. Gas and Water Ord. ...	19/6—21/6	...	...
500,000	1	,,	4½	4½	Do. 4½ p.c. Red. Cum. Pref.	19/6—21/6	...	...
500,000	Stk.	Mar. 15	3½	3½	Do. 3½ p.c. Red. Deb. ...	95—100	...	...
31,035	1	...	...	...	Associated Utilities 4 p.c. Pref.	17/-—19/-	...	...
100,000	Stk.	...	...	...	Do. 3½ p.c. Red. Deb.	95—100	...	...
17,000	,,	Feb. 15	8	8	Bognor Orig. Ord. 'A' ...	160—170	...	...
62,210	,,	,,	8	8	Do. New Addl. 'A' ...	160—170	...	...
87,160	,,	,,	7	7	Do. New 7 p.c. max. ...	141—146	...	...
37,440	,,	Aug. 9	10	10	Cam. Univ. & Town 10 p.c.max.	193—203*	...	...
125,970	,,	,,	7	7	Do. 7 p.c. max.	135—140*	...	...
39,025	,,	,,	5	5	Do. 5 p.c. max.	98—103*	...	...
65,000	,,	Aug. 9	8½	7½	Eastbourne 'A' 5 p.c. ...	158—163*	...	...
198,000	,,	,,	7	6	Do. 'B' 3½ p.c.	128—133*	...	...
112,312	,,	,,	5	5	Do. 5 p.c. Pref.	108—113*	...	...
130,000	,,	June 21	5	5	Do. 5 p.c. Deb.	115—120	...	...
24,000	30	Feb. 1	8½	8½	Great Yarmouth 8½ p.c. max.	45—50	...	...
59,400	30	,,	7½	7½	Do. 7½ p.c. max.	40—45	...	...
51,160	Stk.	June 7	5½	5½	Do. 5½ p.c. Deb.	120—125	...	...
152,600	,,	Feb. 15	8	9	Guildford Cons.	172—177	...	...
54,055	,,	,,	5	5	Do. 5 p.c. Pref.	112—117	...	...
68,250	,,	June 7	5	5	Do. 5 p.c. Deb.	113—118	...	...
156,600	,,	Feb. 15	7½	7½	Hampton Court Cons. ...	160—165	...	...
73,620	,,	Mar. 15	8½	8½	Luton Cons. 'A'	166—171	...	...
107,960	10	Mar. 15	4	5½	Mid Kent Ord.	9—10	...	...
230,940	Stk.	Aug. 9	10	10	Oxford & District Ord. ...	203—208*	...	...
47,112	,,	,,	5	5	Do. 5 p.c. Pref.	108—113*	...	...
50,000	,,	,,	6	6	Do. 6 p.c. Red. Pref. ..	110—115*	...	...
126,193	,,	May 3	7½	7½	Peterborough Ord.	159—169	...	...
64,990	,,	Mar. 15	6½	7½	Redditch Ord.	127—137	...	...
166,850	,,	Aug. 9	8	8	Romford Ord.	155—165*	...	...
60,000	,,	,,	4	4	Do. 4 p.c. Pref.	97—100*	...	...
44,000	,,	Mar. 15	5	5	Do. 5 p.c. Deb.	115—120	...	...
25,570	,,	Aug. 9	5½	5½	Rugby 5½ p.c. Pref.	125—130*	...	...
25,000	,,	,,	6	6	Do. 6 p.c. Red. Pref. ...	106—111*	...	...
42,750	,,	June 7	5½	5½	Do. 5½ p.c. Deb.	122—127	...	...
10,950	,,	Mar. 1	8	8	Ryde Ord.	160—165	...	...
136,191	,,	Aug. 9	7	5	Scarborough Ord.	115—125*	...	...
27,825	,,	Feb. 1	8	8	Shanklin & Ventnor Cons. ...	158—168	...	...
270,086	,,	Mar. 15	7	7	Slough Ord.	137—142	...	...
21,000	,,	June 21	5	5	Do. 5 p.c. Deb.... ...	112—117	...	...
28,872	1	May 24	5½	5½	S. Midland Gas Cpn. Ltd. Ord.	19/—21/-	...	...
28,866	1	Mar. 15	4½	4½	Do. 4½ p.c. Red. Cum. Pref.	18/6—20/6	...	...
137,730	Stk.	Aug. 9	7	7	Southgate & Dist. 7 p.c. max.	140—145*	...	...
62,500	,,	,,	5	5	Do. 5 p.c. Pref.	110—115*	...	...
117,228	,,	Feb. 15	6	5	Swindon Cons.	108—113	...	...
60,425	,,	June 7	5	5	Do. 5 p.c. Deb.	110—115	...	...
64,380	,,	June 7	5	5	Torquay and Paignton 5 p.c. Pf	110—115	...	...
130,000	,,	Aug. 9	8	5	Wakefield Ord.	120—125*	...	...
81,650	,,	,,	5	5	Do. 5 p.c. max.	103—108*	...	...
82,000	,,	Aug. 9	6	6	Weymouth Ord.	103—108*	...	...
98,384	,,	Aug. 9	6	6	Wolverhampton 6 p.c. Pref....	125—130*	...	...
160,000	,,	June 21	5½	5½	Do. 5½ p.c. Rd. Db	108—113	...	...
370,000	,,	Aug. 9	6	4	York Cons.	102—107*	...	...
90,000	,,	June 21	5	5	Do. 5 p.c. Red. Deb. ...	105—110	...	...
133,640	,,	July 19	6½	6½	Yorktown (Cam.) 5 p.c. Cons.	128—133	...	...
120,000	,,	,,	5	5	Do. 5 p.c. Pref.	108—113	...	...
35,000	,,	June 7	5½	5½	Do. 5½ p.c. Deb.	123—128	...	...

a The quotation is per £1 of Stock. *b* Actual for Quarter. * Ex div.

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CONTENTS

EDITORIAL NOTES.

Folkestone Prepares 521
Coke Crystallography 522
Penetration of Crystal Planes 522
West's Gas 523
Migration? 523

In this Week's "JOURNAL" 524
Personal 524
Obituary 524
Forthcoming Engagements 524
Wales and Monmouthshire Association of Gas Engineers and Managers—General Meeting at Porthcawl 524
1937 "JOURNAL" Directory 524
News in Brief 525

Amalgamation and Grouping—
Gas Consolidation and Uttoxeter . . . 526
South-Eastern Offer to Windsor 526
Modern Room Heating—Parkinson's New List 526
Baking *en Route* 526
British Standards Institution—Indexed Lists of Specifications and Methods of Test . . 526
Gas-Operated Radio — The "Thermo-Charger" 526
Cannon Iron Foundries, Ltd., New Offices . 529
Co-Partnership in 1936—Ministry of Labour's Report 529
Teachers Visit Gas-Works and Showrooms . 529
Gas Undertakings' Results 529
Croydon Company Extend to Meet Rural Development—New Main to Addington . 530

The Application of Rawlplugs to Modern Fixing Practice. By R. N. LeFevre, M.Inst.Gas E., A.I.Mech.E. 531
International Gas Union—
Methods for the Development of the Industrial Use of Gas, including the Hotel Industry—Report of the Association des Gaziers Belges 535
Studies on the Formation of Nitric Oxide During the Burning of Town Gas in Burners and Combustion Chambers . . 535
The Work of the Northern Coke Research Committee—Physical and Chemical Properties of Coke 536
Treatment for the Prevention of Holder Discoloration. By John R. Skeen and A. L Ward 537
Trade Notes 541, 543
Gas Markets and Manufactures—
Stock Market Report 543
Current Sales of Gas Products . . 543

Stock and Share Lists 545–46

For Advertisers' Index see PAGE 517.

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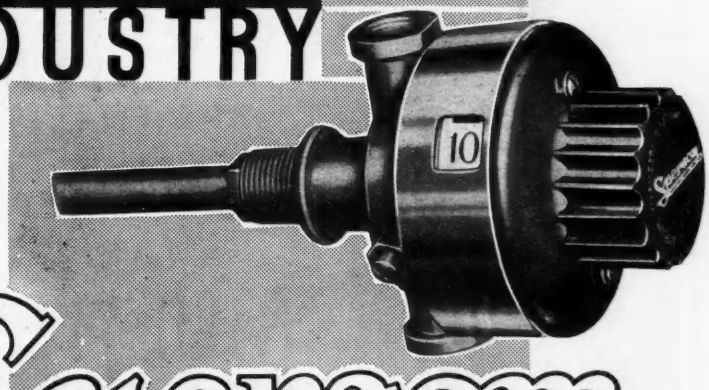

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STOCK AND SHARE LIST—Cont.

Stocks Officially Quoted on Provincial Exchanges

Issue. £	Stock or Share	When ex-Dividend.	Dividends. Prev. Hf. Yr. % p.a.	Dividends. Last Hf. Yr. % p.a.	NAME.	Quotations. Aug. 20.	Rise or Fall on Week.	Transactions, Lowest and Highest During the Week.
BRISTOL EXCHANGE.								
347,756	Stk.	July 19	6	5	Bath Cons.	119—121	...	...
1,667,250	,,	July 19	5	5	Bristol, 5 p.c. max.	117—118	...	...
120,420	,,	June 7	4	4	Do. 1st 4 p.c. Deb. ...	100½—102½	...	...
217,870	,,	,,	4	4	Do. 2nd 4 p.c. Deb. ...	100½—102½	...	...
328,790	,,	,,	5	5	Do. 5 p.c. Deb.	120—123	...	...
274,000	,,	July 19	5	5	Newport (Mon.) 5 p.c.max. ...	101—106	...	...
13,200	12	Mar. 15	7	8	Pontyp'l Gas & W. 10 p.c. 'A'	13½—14½	...	...
13,600	10	,,	5	6	Do. 7 p.c. 'B'	12—12½	...	...
40,000	10	,,	5	6	Do. 7 p.c. 'C'	12—12½	...	...
140,778	Stk.	Aug. 9	5	5	Weston-super-Mare Cons. ...	110—112*	...	...
64,338	,,	June 21	4	4	Do. 4 p.c. Deb.	96—98	...	...
33,340	,,	,,	7½	7½	Do. 7½ p.c. Deb.	157—160	...	...
LIVERPOOL EXCHANGE.								
157,150	Stk.	Aug. 9	6½	5	Chester 5 p.c. Ord.	104—109*	...	...
92,500	,,	June 21	4	4	Do. 4 p.c. Pref.	97—101	...	...
36,430	,,	,,	3	3½	Do. 3½ p.c. Deb.... ...	89—92	...	...
41,890	,,	,,	4	4	Do. 4 p.c. Red. Deb. ...	98—102	...	...
2,167,410	,,	Feb. 15	6	6	Liverpool 5 p.c. Ord. ...	126—128	...	...
245,500	,,	June 21	5	5	Do. 5 p.c. Red. Pref. ...	99—104	...	...
306,083	,,	July 1	4	4	Do. 4 p.c. Deb. ...	102—104	...	...
106,280	,,	Aug. 9	10	10	Preston 'A' 10 p.c.	206—216*	...	...
188,219	,,	,,	7	7	Do. 'B' 7 p.c.	147—157*	...	...
NEWCASTLE EXCHANGE.								
122,577	Stk.	Aug. 9	8	8	Blyth 5 p.c. Ord.	165—166*	...	...
732,000	,,	Feb. 15	5	5	Hartlepool G. & W. Cn. & New	122—123	...	...
2,061,315	,,	Aug. 9	5½	5	Newcastle & Gateshead Con.	24/3—24/9*a	+⅛/1⅛	...
682,856	,,	,,	4	4	Do. 4 p.c. Pref. ...	98—99*	...	...
776,706	,,	June 21	3½	3½	Do. 3½ p.c. Deb. ...	91—92	...	...
277,285	,	Nov. 2	5	5	Do. 5 p.c. Deb. '43...	108—109	...	...
332,351	,	Feb. 15	6	6	Sunderland 6 p.c. max. ...	139—141	...	...
NOTTINGHAM EXCHANGE.								
542,270	Stk.	Aug. 9	9	6	Derby Con.	150—160*	...	...
55,000	,,	June 7	4	4	Do. 4 p.c. Deb.	100—105	...	...
84,750	,,	Feb. 17	5	12	Long Eaton 'A' Ord. ...	...	...	...
50,000	,,	,,	4	10	Do. 'B' Ord. ...	...	...	...
20,000	10	June 21	5	5	Do. 5 p.c. Pref. ...	10—12	...	...
80,000	Stk.	,,	5	5	Do. 5 p.c. Deb. ...	105—110	...	...
SHEFFIELD EXCHANGE.								
10,000	Stk.	Feb. 15	10	10	Great Grimsby 'A' Ord. ...	210—220	...	...
6,500	,,	,,	10	10	Do. 'B' Ord. ...	210—220	...	...
79,000	,,	,,	10	10	Do. 'C' Ord. ...	205—210	...	...
1,806,339	,,	Feb. 15	6	6½	Sheffield Cons.	146—150	...	...
95,000	,,	July 5	4	4	Do. 4 p.c. Deb.... ...	100—103	...	...

Supplementary List of Stocks and Shares not Officially Quoted

202,152	Stk.	Mar. 15	25/-b	25/-b	Ascot Ord.	102—107	...	...
128,182	,,	July 5	5	5	Do. 5 p.c. Pref.	108—113	...	...
573,156	1	May 24	5	5	Assd. Gas and Water Ord. ...	19/6—21/6	...	...
500,000	1	,,	4½	4½	Do. 4½ p.c. Red. Cum. Pref.	19/6—21/6	...	...
500,000	Stk.	Mar. 15	3½	3½	Do. 3½ p.c. Red. Deb. ...	95—100	...	...
31,035	1	...	...	...	Associated Utilities 4 p.c. Pref.	17/—19/-	...	...
100,000	Stk.	...	...	...	Do. 3½ p.c. Red. Deb.	95—100	...	...
17,000	,,	Feb. 15	8	8	Bognor Orig. Ord. 'A' ...	160—170	...	...
62,210	,,	,,	8	8	Do. New Addl. 'A' ...	160—170	...	...
87,160	,,	,,	7	7	Do. New 7 p.c. max. ...	141—146	...	...
37,440	,,	Aug. 9	10	10	Cam. Univ. & Town 10 p.c.max.	193—203*	...	...
125,970	,,	,,	7	7	Do. 7 p.c. max.	135—140*	...	...
39,025	,,	,,	5	5	Do. 5 p.c. max.	98—103*	...	...
65,000	,,	Aug. 9	8½	7½	Eastbourne 'A' 5 p.c. ...	158—163*	...	...
198,000	,,	,,	7	6	Do. 'B' 3½ p.c.	128—133*	...	...
112,312	,,	,,	5	5	Do. 5 p.c. Pref.	108—113*	...	...
130,000	,,	June 21	5	5	Do. 5 o.c. Deb.	115—120	...	...
24,000	30	Feb. 1	8½	8½	Great Yarmouth 8½ p.c. max.	45—50	...	...
59,400	30	,,	7½	7½	Do. 7½ p.c. max.	40—45	...	...
51,160	Stk.	June 7	5½	5½	Do. 5½ p.c. Deb.... ...	120—125	...	...
152,600	,,	Feb. 15	8	9	Guildford Cons.	172—177	...	...
54,055	,,	,,	5	5	Do. 5 p.c. Pref.	112—117	...	...
68,250	,,	June 7	5	5	Do. 5 p.c. Deb.	113—118	...	...
156,600	,,	Feb. 15	7½	7½	Hampton Court Cons. ...	160—165	...	...
73,620	,,	Mar. 15	8½	8½	Luton Cons. 'A'	166—171	...	...
107,960	10	Mar. 15	4	5½	Mid Kent Ord.	9—10	...	...
230,940	Stk.	Aug. 9	10	10	Oxford & District Ord. ...	203—208*	...	...
47,112	,,	,,	5	5	Do. 5 p.c. Pref.	108—113*	...	...
50,000	,,	,,	6	6	Do. 6 p.c. Red. Pref. ..	110—115*	...	...
126,193	,,	May 3	7½	7½	Peterborough Ord.	159—169	...	...
64,990	,,	Mar. 15	6½	7½	Redditch Ord.	127—137	...	...
166,850	,,	Aug. 9	8	8	Romford Ord.	155—165*	...	...
60,000	,,	,,	4	4	Do. 4 p.c. Pref.	97—100*	...	...
44,000	,,	Mar. 15	5	5	Do. 5 p.c. Deb.	115—120	...	...
25,570	,,	Aug. 9	5½	5½	Rugby 5½ p.c. Pref.	125—130*	...	...
25,000	,,	,,	6	6	Do. 6 p.c. Red. Pref. ...	106—111*	...	...
42,750	,,	June 7	5½	5½	Do. 5½ p.c. Deb.	122—127	...	...
10,950	,,	Mar. 1	8	8	Ryde Ord.	160—165	...	...
136,191	,,	Aug. 9	7	5	Scarborough Ord.	115—125*	...	...
27,825	,,	Feb. 1	8	8	Shanklin & Ventnor Cons. ...	158—168	...	...
270,086	,,	Mar. 15	7	7	Slough Ord.	137—142	...	...
21,000	,,	June 21	5	5	Do. 5 p.c. Deb.... ...	112—117	...	...
28,872	1	May 24	5½	5½	S. Midland Gas Cpn. Ltd. Ord.	19/—21/-	...	...
28,866	1	Mar. 15	4½	4½	Do. 4½ p.c. Red. Cum. Pref.	18/6—20/6	...	...
137,730	Stk.	Aug. 9	7	7	Southgate & Dist. 7 p.c. max.	140—145*	...	...
62,500	,,	,,	5	5	Do. 5 p.c. Pref.	110—115*	...	...
117,228	,,	Feb. 15	6	5	Swindon Cons.	108—113	...	...
60,425	,,	June 7	5	5	Do. 5 p.c. Deb.	110—115	...	...
64,380	,,	June 7	5	5	Torquay and Paignton 5 p.c. Pf	110—115	...	...
130,000	,,	Aug. 9	8	5	Wakefield Ord.	120—125*	...	...
81,650	,,	,,	5	5	Do. 5 p.c. max.	103—108*	...	...
82,000	,,	Aug. 9	6	6	Weymouth Ord.	103—108*	...	...
98,384	,,	Aug. 9	6	6	Wolverhampton 6 p.c. Pref....	125—130*	...	...
160,000	,,	June 21	5½	5½	Do. 5½ p.c. Rd. Db	108—113	...	...
370,000	,,	Aug. 9	6	4	York Cons.	102—107*	...	...
90,000	,,	June 21	5	5	Do. 5 p.c. Red. Deb. ...	105—110	...	...
133,640	,,	July 19	6½	6½	Yorktown (Cam.) 5 p.c Cons.	128—133	...	...
120,000	,,	,,	5	5	Do. 5 p.c. Pref.	108—113	...	...
35,000	,,	June 7	5½	5½	Do. 5½ p.c. Deb.... ...	123—128	...	...

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